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Introduction

Hate to read? No problem. **We can read the text to you**.

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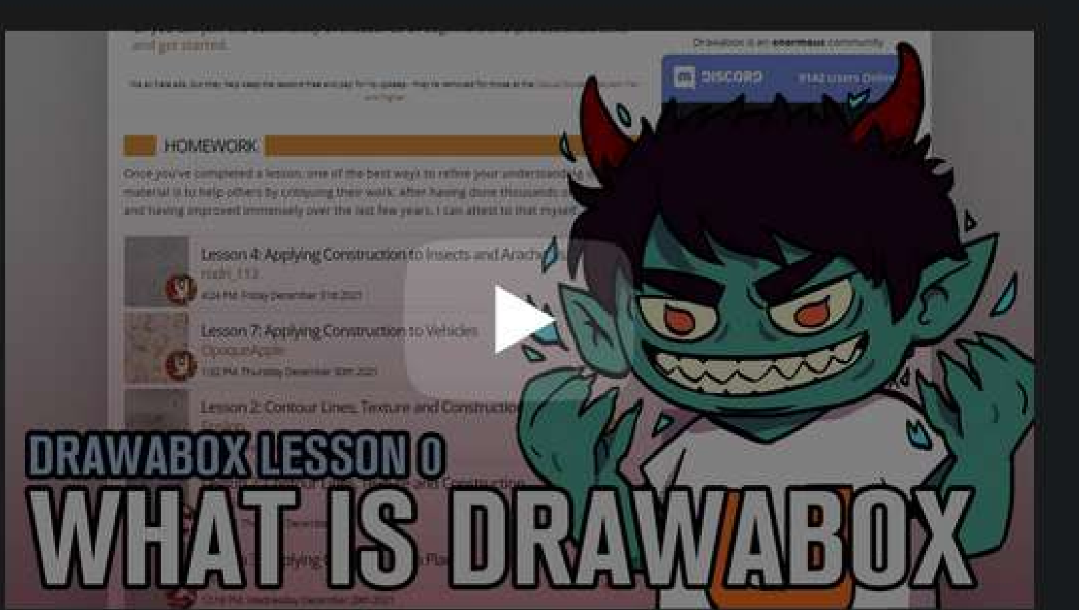

What is Drawabox?

Drawabox is, at its core, a community of people developing their drawing skills. Our members range from total beginners, to self-taught artists seeking more structured ways to practice, to established artists looking to sharpen their skills.

This community revolves around the free lessons I've written (and rewritten, and rewritten again), which were originally built upon the foundations of what I learned from Peter Han**'s Dynamic Sketching course** when I attended Concept Design Academy in 2013. Peter's own lessons build upon the work of his mentor, the late Norm Schureman.

Dynamic Sketching had an enormous impact on me, and while I've chosen to narrow the focus of Drawabox to a very specific set of "core" fundamental concepts, I still believe Dynamic Sketching is an excellent course to take at *some* point - specifically because where Drawabox will teach you to make your drawings feel solid and three dimensional, Dynamic Sketching will teach you to make them look *really* cool.

You can take Dynamic Sketching with Peter Han himself (although this is quite expensive, due to it including feedback from the instructor).

Another, more affordable option is the Dynamic Sketching video course with Charles Hu over on New Masters Academy, where it's included in their monthly subscription. Since they're our sponsor, you can also get 35% off your first billing cycle with them, **using our coupon code DRAWABOX22**.

Drawabox's goal is to provide beginners with a strong foundation, and to equip them with the things a lot of other courses and tutorials tend to take for granted. We achieve this by treating drawing less as an academic pursuit focusing on memorization, and more like an athletic one. While concepts are certainly explained, they are hammered in through active drills and repetition.

Drawabox is a **very rigorous course**. Some students have completed it in as little as 5 months, while others have taken a year, or even two. What matters is that you give each exercise, and each drawing, as much time as it requires to be executed **to the best of your current ability**. Setting your own deadlines or expectations is *highly* discouraged - it'll cause you to rush, and to progress more slowly in the long run. Plenty of students come here with the intent to achieve something specific in a certain amount of time - if that is a necessity for you, then this course may not be the best choice.

It is not going to make you a professional on its own, but it will teach you **how to practice**, **how to use the resources available to you on the internet**, and **equip you with the tools and skills you need to take advantage of them**. Think of Drawabox as one big tutorial zone in a sandbox game; it'll take a while to get through it, but once you're done, you'll be ready to enter a world full of fun and interesting sources of instruction.

What are the fundamentals?

The answer to this question depends on who you ask - but what we cover here focuses on a specific subset of what others might call out when listing the fundamentals of drawing.

We call these the **core fundamentals of drawing** - the things you'll need to apply and learn everything else more effectively. These core fundamentals focus in three areas:

- Confident and controlled **MARK MAKING** - the ability to make the marks you intend to make, and to keep them smooth and hesitation-free.
- Attentive and fastidious **OBSERVATION**
- And the big focus of this course overall: **SPATIAL REASONING** - the understanding deep in your brain that despite drawing on a flat page, the things you're producing exist in a real, three dimensional world. The page itself is merely a window looking out onto that world.

These are not *everything* there is to know, but they lay down a solid foundation upon which everything else can be built. For example, while we do not touch upon any lighting, rendering, or shading in this course, such concepts rely on understanding how different objects and surfaces might relate to a light source in the scene - which is what we develop by working on spatial reasoning.

As mentioned in the video above, while Drawabox focuses on a limited set of core concepts, you are still encouraged to explore any others that may be of interest to you. Doing so alongside what you learn here will help you develop into a more well-rounded artist.

Our sponsor, **New Masters Academy**, has a ton of material that explore other fundamentals of drawing. For example:

- Art Anatomy for Beginners with Steve Huston
  Steve Huston explores the human body in a manner that lines up exceptionally well with the focus on form and spatial reasoning we explore here, making this analytical approach to figure drawing an excellent complement to our lessons. I've actually been on the hunt for years for an online course that follows the same methodology I learned from Kevin Chen years ago - and this fits the bill perfectly.
- Drawing with FORCE with Michael Mattesi
  Figure drawing is a marriage of two core concepts - structure and gesture. In this course, Michael Mattesi explores his unique, physics-based methodology for drawing bodies that move naturally and believably through the space in which they exist.
- Fundamentals of Observational Drawing with Iliya Mirochnik
  In this course, Iliya teaches a variety of observational drawing tools and techniques, with a focus on the Russian Drawing Approach - a distinct methodology that has remained largely unaltered in over two centuries. This course also includes two lessons dedicated to teaching the fundamentals of light and shadow, which will help you understand the basics of shading.
- Finding Your Voice as an Artist with Steve Huston and Bill Perkins
  This course by Steve Huston and Bill Perkins (of Little Mermaid and Aladdin fame) takes an analytical approach to breaking down the concepts of personal style, and helps students to find a guiding direction for their journey.

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How is Drawabox free?

Drawabox is a business, but I am a strong believer that we can provide free resources, and cheap access to feedback, while still compensating our team well for their work.

We're able to do this while remaining viable as a business because of our credit-based pricing structure. Those who subscribe here through Patreon at any of the student tiers receive "credits" when they are charged, and those credits expire two months after their receipt. Those who can afford to allow some (and even all) of their credits to expire, allowing their contribution to go towards subsidizing the overall price for others, whereas those who have tighter budgets can maintain control by subscribing, cancelling, and re-subscribing as needed.

As we continue to grow, we are working towards constantly improving the lessons, applying what we've learned by explaining concepts in thousands of critiques to updates and rewrites of lesson content, and expanding more of the lesson critiques to our team of teaching assistants. In doing so, it will allow me to focus more on refining the material, and expanding what we're able to offer on the free side of things even further.

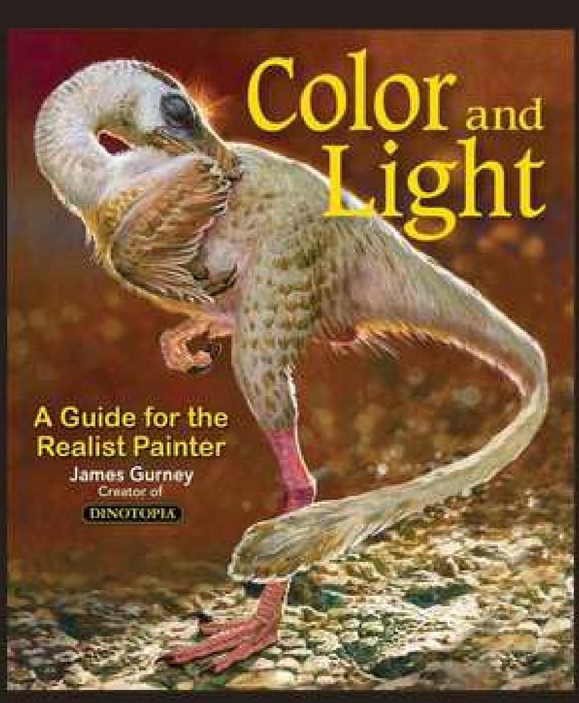
Along with the critiques we offer, and our smaller supporter-tier patrons, Drawabox is funded by:

- Display advertisements on the website - although currently our generous sponsor, New Masters Academy, has purchased all of our advertising slots to provide you with a much cleaner, less distracting learning experience. Every student who signs up with NMA using our DRAWABOX22 coupon code both gets 25% off their first billing cycle *and* helps support Drawabox.
- Importing and selling fineliner pens - this is primarily to provide the community with access to good quality fineliners at a far cheaper price (though we're only able to offer them with free shipping in the continental United States, so they're not necessarily as good of a deal internationally).
- Affiliate link recommendations through Amazon, where we earn a small commission for any sales that use our links

If you're unable to support us through Patreon, consider shopping through our affiliate links, signing up for New Masters Academy using our DRAWABOX22 coupon code, or purchasing our pens when they are in stock.

On the next page, let's look at just how a lot of students tend to think about drawing, what they are and aren't ready for, and what keeps holding them back.

Changing your Mindset >>>



Color and Light by James Gurney

Some of you may remember James Gurney's breathtaking work in the Dinotopia series. This is easily my favourite book on the topic of colour and light, and comes highly recommended by any artist worth their salt. While it speaks from the perspective of a traditional painter, the information in this book is invaluable for work in any medium.

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LISTEN WITH DRAWABOX

DRAWABOX LESSON 0
CHANGING YOUR MINDSET AND THE 50% RULE

The hardest thing you'll ever do

All of you are here because of one central desire: **you want to get better at art**. As such, your focus falls squarely on one thing: your drawings. But your drawings are just one part of what it means to *draw* - they're just the end result, and while right now to you that's the most important, I propose an alternative view:

The end result is getting in your way.

Our entirely natural obsession with drawing things that look good - to impress ourselves, to impress those around us, and to impress people on the other side of the planet whom you've never met - is above all else what holds us back. It stresses us out, and puts us into a state of creative paralysis. It pushes us to focus on nothing but practice, on training, on exercises, and leaves us drained. And worst of all, it makes us *fear* doing precisely the things for which we're learning these skills.

Oh, if I had a nickel for every student who declared "I *can't* draw that." It's such a common statement, but what it *really* means is "I can't draw that well right now, so what reason do I have to try?" Or more poignantly, "**To try would be a waste of my time**." And for this, I blame traditional academics. School makes us terrified of failure, and declares "success" as the only useful result. But I think differently.

Failure is a beginner's job

While as children we're taught to run from failure - and even to actively avoid doing something if it has a low chance of success - failure is not only *okay*, or *good* - but a critical and integral part of the learning process. Where success tells us where we are in our development, and what we've achieved thus far (something that should be acknowledged and appreciated), it is failure that points ahead and tells us what paths lay ahead of us to grow beyond what we are today.

Failure shows us where we have yet to go, and what we have yet to become.

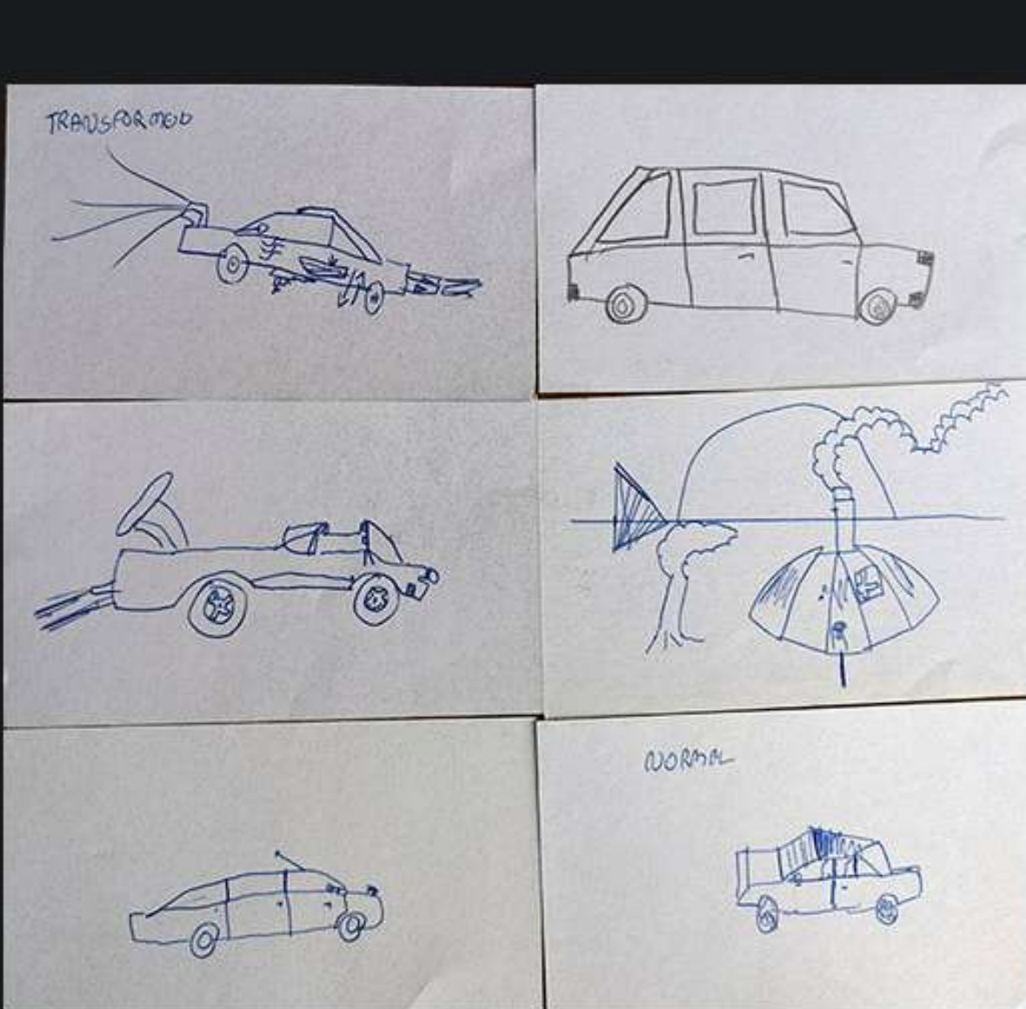
The mistake we all make is that we take our failures personally. We come to interpret a *bad drawing* as reflecting upon ourselves - if we draw badly, we ourselves must be bad. If we are unable to succeed, then this must mean that we ourselves are less valuable. That *we* should be ashamed. But ashamed of what? **Ashamed of being a beginner**? Nonsense.

Everyone starts somewhere, and that somewhere is as a beginner. Some people are only a beginner for a short period, whereas many will continue to be beginners for years. Or perhaps you're like me - eternally a beginner in some regard, always with something new to learn.

How we approach learning, our frame of mind as we do so, the kinds of exercises we do, and the people we choose to follow - these are all factors that influence how we learn and progress, and at what rate we improve. But throw that all aside, because what's important is one simple fact: **Being a beginner is not a bad thing**.

If anything, it should be a position of freedom. After all, what on earth does anyone have to expect from a beginner? You're growing on your own time, at your own pace, and no one - especially not yourself - has any right to apply any expectations to that. Unfortunately, we are most often our own bullies in this regard, the ones leveraging those undue and unfair expectations, crushing ourselves before we've even truly begun.

"Ready"



Some of you love to draw on your own. You'll sit with a stack of paper, or with a tablet and computer, or whatever else - and happily draw away. **But the vast majority of you don't**. You *want* to draw, you love the idea of drawing, and perhaps you can imagine yourself one day drawing like the masters you admire - but right now, if invited to do so, you give a simple answer: **I'm not ready**.

I want you to ask yourself a simple question: **Not ready for what?** Not ready to...

Draw things *well*? What's wrong with drawing something badly? What's wrong with playing around, experimenting for the hell of it? Does every drawing you produce have to be amazing? If that's the case, I've got bad news for you - because every artist you admire sits atop a mountain of awful, embarrassing garbage that they've produced over the years. It's unlikely you'll be the unique, special prodigy, to avoid that.

A lot of people will tell me, "oh but you don't understand - I'm a **complete** beginner, I don't know anything!" I can assure you, neither did I when I attempted to draw these cars as a child.

Do not expect better for yourself than I did then.

The 50% rule

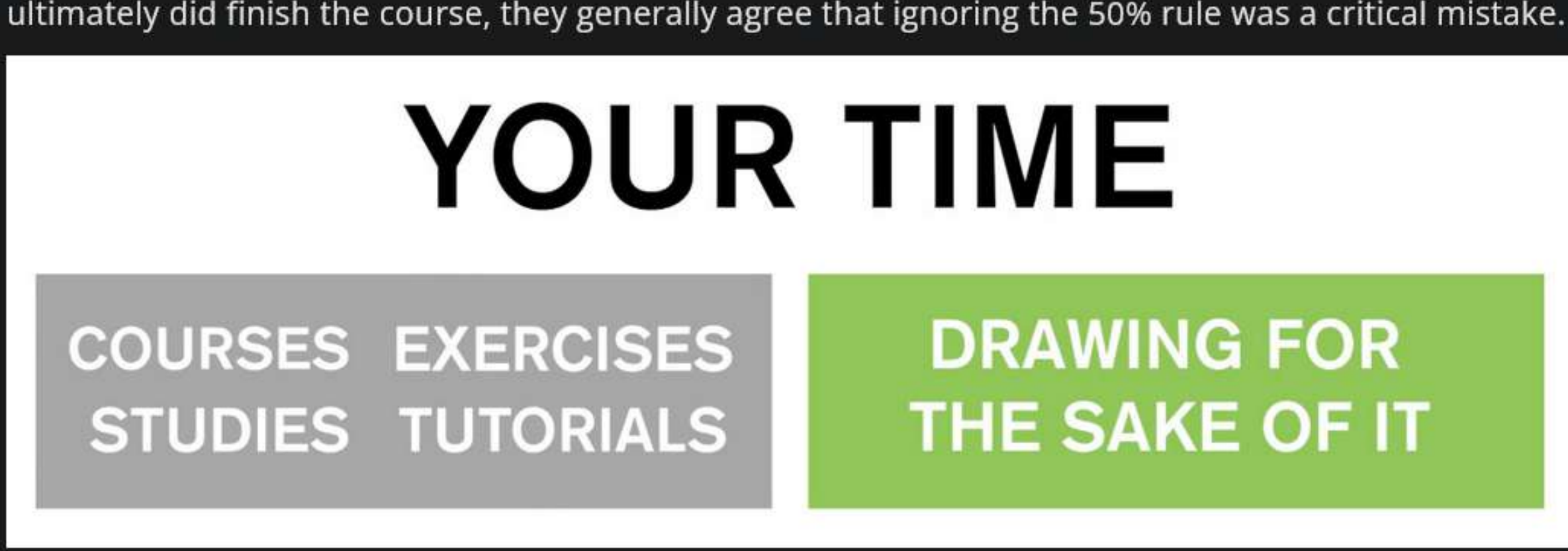
And finally, that brings us to why this is relevant to you. **Everyone following this course is expected to abide by what we call the 50% rule, without exception**.

The 50% rule is simple. All of the time you spend on drawing is to be divided into two equal portions.

- One half will include anything and everything you do with the purpose of improving your skills. Coursework, exercises, studies, tutorials, etc.
- The other half is **reserved only for drawing done for the sake of drawing**. In other words, **play**. Experimentation, just throwing yourself at the page and giving yourself full freedom to just *try*, even though the result will likely turn out badly.

Another way of thinking about it is that every minute you spend on *learning*, should be matched with another minute spent on play. Every day does not have to be split so evenly (not everyone has hours to throw at drawing each day). You could alternatively spend one session learning, and the next session playing.

This rule is something most students hate, and struggle with immensely. Many will view the difficulty of it as being reason to ignore or skip it, so understand that you are not alone. Of course, many still have (and inevitably will) pushed forward without following this rule - and of those who ultimately did finish the course, they generally agree that ignoring the 50% rule was a critical mistake.


YOUR TIME
COURSES EXERCISES STUDIES TUTORIALS
DRAWING FOR THE SAKE OF IT

But why?

There are a number of reasons why the 50% rule is extremely beneficial, despite how clearly frustrating and difficult it can be to follow:

> **It'll help develop skills that do need to be developed at some point, and doing it now will help you avoid some stinging disappointment later on**.

To put it simply, it becomes a lot harder to learn how to play when you've developed the technical skill, and the expectations that come along with it. As a beginner, there are still some barriers of expectation, but it's far easier to remind yourself of the simple fact that you are a beginner, and that any such expectations are utterly ridiculous. After you've spent six months, or a year, or two, "learning the fundamentals" though, if you find yourself still struggling to apply those skills to the things that are truly important to you, you might just throw everything in the garbage and quit.

> **The "Downtime" spent on things other than active learning, preferably in a more relaxing fashion, will help you process the things you've learned, and absorb them more fully**.

It helps us learn, and process the information we absorb through the lessons. In learning, there's time spent actually studying, doing exercises, reading instructional books, and so on. We'll call this the "positive" space of learning, the real meat of it. And then, on the flipside of the same coin, there is the "negative space". That is, the time in between, which we spend on pretty much everything that isn't active learning. Eating, sleeping, watching TV, reading fiction, hanging out with friends, or playing video games.

Traditional academics, and really anything that puts a lot of focus on achievement and ambition, focuses heavily on the "positive" space of learning, and in doing so, it makes us ignore and even reject the clear benefits of the other side. Taking breaks, pushing our brain to focus on other things, playing, and sleeping are all incredibly important for the simple reason that our brain needs time to process and assess what we've learned. It cannot do this while it is continually taking in yet more new information.

Those who cram for exams, rather than pacing themselves and spreading things out, encounter this frequently. In order to learn optimally, we must seek balance. Balance between work and play.

> **Cleanly separating work and play allows us to do each whole-heartedly**.

It's common for students to get bored and distracted when forced to study and work for too long, and this can result in aimless doodling on the side. While doodling isn't inherently bad, as a lot of people doodle while listening to lectures and find it helps them better absorb the material, it does however impact how carefully a student might complete a drawing exercise, as it pulls away some of the cognitive resources we need to be using in order to complete the work to the best of our current capacity.

By creating clearly delineated times for work and for play, we are able to burn off that nervous energy, so we can focus our cognitive resources singularly on the task at hand when it's time to work. This also means that when we play, having done our work at our best, we can more easily allow ourselves to play without shame.

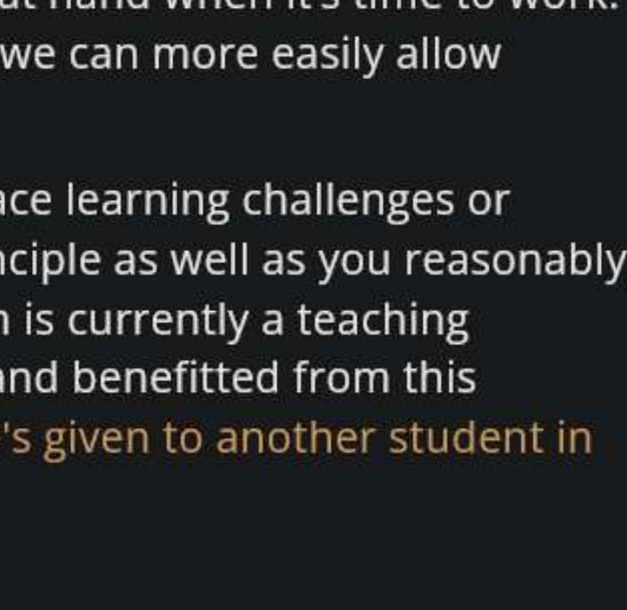
Note: I cannot speak to how directly this applies to those of you who face learning challenges or conditions like ADHD, and I must leave it to you to try to apply this principle as well as you reasonably can. I can however say that we have students with ADHD (one of whom is currently a teaching assistant, as well as a freelance illustrator) who have worked through and benefitted from this course. You can read more about her experiences in this response she's given to another student in our community (scroll down to the post by sluggydragon).

Depression and learning art

As the 50% rule relates heavily to mental health, I would be remiss not to take a moment to talk about **depression**. A lot of people out there will really struggle with the idea of doing something only to fail. As I've mentioned already, many of us have been taught that our value as an individual is inextricably tied to our ability to succeed, to the point where forcing yourself to fail (as this course will have you do quite a bit) can actively trigger depressive episodes. It gets that much worse when you consider how many people actively try and use art as therapy — not as part of a larger regimen under the guidance of a professional, but as their singular self-prescribed solution, and unfortunately it can make things worse.

For those of you in that situation, **I strongly urge you to seek whatever professional support you can**. Therapy with a trained professional isn't about changing who you are, or attempting to *fix* you. Rather, at its core it's about giving you the tools you need to better manage and understand your emotions, so that when you're faced with a bad drawing, you can understand not just on a logical level, but deep within you that this does not in any way suggest that you yourself are bad. So, don't be afraid to step away from this course, and to seek out that help. We'll still be here when you're better equipped.

Drawing Prompts


DRAWING A BLANK?
TRY THESE DETAILED DRAWING PROMPTS

Many of you will insist that you don't know what to draw.

While in the video above I do explain such a feeling to be based primarily on our tendency to filter our ideas, disregarding anything that we don't deem to be something we could execute successfully right now, understanding this on a logical level doesn't mean you can just flip a switch and suddenly let the ideas flow. It'll still be hard.

For those of you who are struggling to come up with anything to draw, we actually have a tool you'll find on the home page that'll provide you with a random, detailed-yet-open-ended prompt to get your brain juices flowing.

50% rule FAQ

There are a few questions we get pretty often in regards to the 50% rule, so let's clarify them right off the bat.

> **Should I be trying to apply the techniques from Drawabox while working on the 50% rule?**

No. Draw in whatever way feels most comfortable to you. Drawabox is designed to have you drawing so much that you will have plenty of mileage to take the lessons and push them down into your subconscious. The lessons will become instinct. Rather, as you play, it's better not to be too stiff and worried about technique. This is the time where you want to just let go.

> **Do I have to do my 50% rule in pen?**

This question comes up simply because we really stress the use of pen and ink when doing the Drawabox lessons. Again, the answer is no. Draw with whatever tools you're interested in using. A lot of students come to Drawabox really interested in digital media, but end up disappointed that we focus so much on traditional tools. I get it — I'm almost strictly a digital artist myself — and we'll get into the reasoning for this later. Rest assured though, you are welcome and even encouraged to dive straight into drawing and painting digitally as soon as you like, for this 50%. This will also have the benefit of helping you get used to the specifics of using those tools, as this is yet another skill that is separate from these core fundamentals of drawing, and will need to be explored at some point.

> **Third: Can I use reference during the 50% rule time?**

This is a difficult one, because the answer is both yes and no. It comes down to understanding your own intentions — are you reaching for reference specifically because you're afraid to draw something badly? If that's the case, if it's something you just would not bother to try without the reference, then no. Draw it however you can, from your imagination, and let it go poorly.

If however you're completely comfortable with that — perhaps after you've done your 50% rule time without reference for a few weeks, just to be sure — you can go ahead and use reference, with one major caveat: you may not simply work from a single reference image, effectively copying it as it is.

This is called a study, and it's a useful drawing exercise that involves copying an object from observation or from a reference photo, in order to learn more about some specific aspect of it. As it is a tool for learning and improving, it falls under the same 50% as Drawabox and whatever other courses, lessons, exercises and tutorials you may be working through.

Instead, you need to make the decisions yourself, and merely use reference to fill in the gaps. For example, you may decide to draw a character astride a tiger, charging through a bazaar. Good luck finding a photo of exactly that to paint from. Instead, you'd find a picture of a tiger running, a person riding a horse, and multiple shots of market stalls, taking parts from each of them and incorporating them into your work.

To be completely clear, there's nothing wrong with reference, and you should not be interpreting the above as "reference is bad and you should never use it". If that's how you interpreted it, then go back and reread the section. Reference is fine - what we're talking about is the first few weeks of the 50% rule, where many students may actively sooth their fears of drawing something badly by hiding behind reference instead of using it as a tool. Once you're not doing that, **reference is fine to use** as described above.

Pushing yourself just to draw for the hell of it can be a lot harder than it sounds. Here are some course recommendations from **New Masters Academy** to help you loosen up.

- Stress-Free Sketching with Sheldon Borenstein
  Sheldon Borenstein explores different techniques for pushing past that mental block and just putting marks on the page. I find the topic for Week 4 of his course, "Scribble - the Soul of the Drawing," to be a particularly accessible and effective - after all, everyone can scribble.

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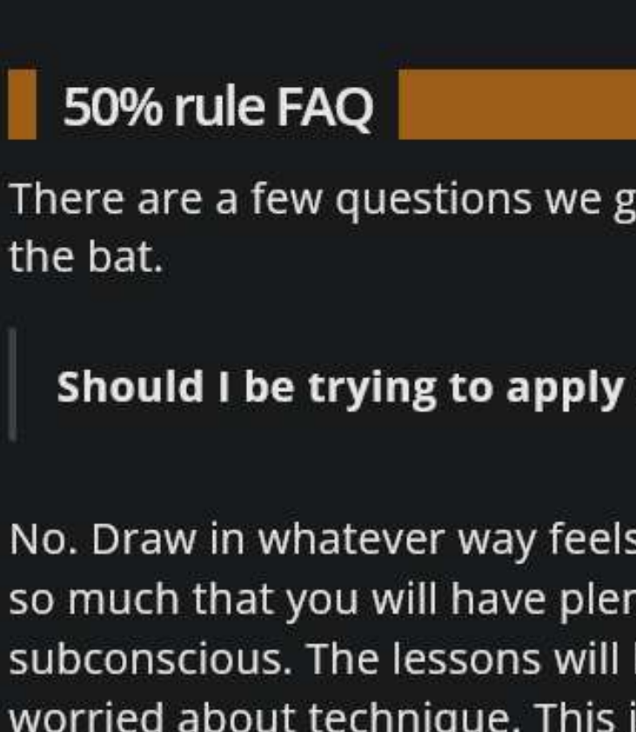
BUT WAIT!
THERE'S MORE!

Other resources

I get it. This sort of thing is hard to understand - at its core, the 50% rule is about accepting that your mental health is more important than *anything*, and while society may convince you that you are only as valuable as what you can *do*, that is quite frankly **a lie**. Your ability to draw (or lack there of) has nothing to do with who you are as a person - as much as you may want it to - and drawing poorly does not reduce one's worth as a person. Just as in quite the same way, learning how to draw better will not make you a more worthy person.

This may be something you understand on a logical level, but believing it is a life-long task you will need to work at constantly. The 50% rule is, in all honesty, a big part of that.

Here's a list of other videos and resources on this kind of topic that can help you better understand how to think about your own emotions in regards to drawing.

- **Myself, on Overcoming the Fear of a Blank Page**. I talk about how even after a decade of drawing, I still spent most of my time paralyzed in front of a blank canvas - and more importantly, how I finally broke free of that fear.
- **Steven Zapata, on Personal vs Impersonal Satisfaction in Art** (8:34). This talk is about the dangers of associating your successes and failures in individual drawings too closely with your satisfaction (and dissatisfaction) in life.

I will continue to add onto this list as I find other material.

<<< Introduction

Using this Course >>>

Staedtler Pigment Liners

These are what I use when doing these exercises. They usually run somewhere in the middle of the price/quality range, and are often sold in sets of different line weights - remember that for the Drawabox lessons, we only really use the 0.5s, so try and find sets that sell only one size.

Alternatively, if at all possible, going to an art supply store and buying the pens in person is often better because they'll generally sell them individually and allow you to test them out before you buy (to weed out any duds).

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LISTEN WITH DRAWABOX

Getting the most out of Drawabox

This video explores the different mindsets that we've encountered from our students, those that work well with this course, and those that hinder one's progress.

It also explains how students can access feedback on their work, how the community feedback and official critique works, and so on.

Above all else, remember this: **follow the instructions to the letter**. Complete only the work that is assigned, as it is assigned, and do not deviate in any way from what is asked. We do not expect your work to be perfect, or even good.

Rather, you have but one responsibility - to give yourself enough time to apply the lesson material and follow the instructions to the best of your current ability.

Community feedback vs. official critique

There are a few major distinctions between the two main categories of feedback a student can receive on their homework.

- **Community feedback is free**, but not guaranteed, as it relies on the good will of other students. While we have future plans to expand the reliability and structure of what our free students are able to access, right now I highly recommend making use of the unofficial critique exchange program hosted on our Discord server by one of our TAs, Elodin.
- **Official critique is paid**, although it is one of our core principles to price it as cheaply as possible - to the point that we actually pay our teaching assistants as much as *twice* what a student would be paying for the same critique, something we can only achieve through our credit system (which is explained in more detail in the video).

In order to ensure that we're able to provide that feedback as cheaply as possible, we do impose certain hard requirements (which are only recommendations when submitting to the community):

- **Students start at Lesson 1**, only moving onto the next step when their previous work has been marked as complete by a teaching assistant or instructor. You effectively have until you're finished Lesson 1's homework to decide which track you'd like to take (without redoing anything).
- **You must work with the recommended tools**. We'll get into this in more detail later in Lesson 0, but for the most part it means working with fineliner pens and paper - not digitally, not in pencil. I cannot stress this enough - it's not because we think pens are the greatest tool ever invented. I myself am almost strictly a digital artist.
- **All submissions for official critique must be complete**. Meaning, you may not submit partial work. In the case that a lesson includes multiple sections (like Lesson 1 has the Lines, Ellipses, and Boxes sections), all sections' assigned work must be included in your submission.
- **There is a 2 week cooldown between submissions**. If you were to submit your homework today and have it marked as complete, you would not be able to submit your next lesson or challenge until 14 days have passed. **This is not a deadline**, and most of the lessons will probably take more than 14 days to complete.

While we strongly recommend that *everyone* follows these rules regardless of what track they follow, they are only hard requirements for those receiving official critique.

How do I sign up for official critique?

If you're interested in pursuing the official critique route, you can sign up via Patreon. In the future we hope to offer other alternative payment options.

Important things to note:

- ~~Patreon charges at the time of sign-up, and on the first of the next month (in the Pacific timezone).~~ As of September 2022, this has changed. Now the subscriptions work more normally - you'll be charged each month on the same day as when you signed up, until you cancel.
- **Each credit expires 2 months after you receive it**, and goes towards subsidizing the cost of critiques for everyone. This is a critical part of why we're able to provide feedback as cheaply as we do.

Warmups

So you've reached the point at which you've had a lesson marked as complete. What now? Are we done with those exercises forever?

Hah! As if you'd be so lucky. No, those exercises aren't going away any time soon.

Whenever we complete a lesson or challenge, the exercises from that lesson goes into a "pool" of warmup exercises, and at the beginning of each sitting, **we randomly pick 2 or 3 of those exercises to do for 10-15 minutes**. This allows us to continue sharpening those skills, and helps us keep them sharp as we continue to move forwards. After all, when we've had a lesson marked complete, that doesn't mean we've mastered the exercise. It's merely a confirmation that we're headed in the right direction with them, and that we understand what we're meant to be aiming for.

Warmups are incredibly important - to the point that if you decide that you're going to take a break from Drawabox, you should still try to keep up with your warmups. 10-15 minutes per day (or every other day, etc.) is not too much, but it'll keep you from getting rusty in the interim.

Keep in mind that in that 10-15 minutes, you don't need to do a *whole* page of the given exercise - you merely do what you can in that time period. You can also choose to spread a page across multiple sittings, picking the same exercise across a few sittings until the page is done. All that matters is that you continue practicing regularly, and that none of the exercises get abandoned.

On the next page, we'll look at the tools we'll be using for these lessons.

<<< Changing your Mindset

Required/Recommended Tools >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Drawabox-Tested Fineliners (Pack of 10, $17.50 USD)

Let's be real here for a second: fineliners can get pricey. It varies from brand to brand, store to store, and country to country, but good fineliners like the Staedtler Pigment Liner (my personal brand favourite) can cost an arm and a leg. I remember finding them being sold individually at a Michael's for $4-$5 **each**. That's highway robbery right there.

Now, we're not a big company ourselves or anything, but we have been in a position to periodically import large batches of pens that we've sourced ourselves - using the wholesale route to keep costs down, and then to split the savings between getting pens to you for cheaper, and setting some aside to one day produce our own.

These pens are each hand-tested (on a little card we include in the package) to avoid sending out any duds (another problem with pens sold in stores). We also checked out a handful of different options before settling on this supplier - mainly looking for pens that were as close to the Staedtler Pigment Liner. If I'm being honest, I think these might even perform a little better, at least for our use case in this course.

We've also tested their longevity. We've found that if we're reasonably gentle with them, we can get through all of Lesson 1, and halfway through the box challenge. We actually had ScyllaStew test them while recording realtime videos of her working through the lesson work, which you can check out here, along with a variety of reviews of other brands.

Now, I will say this - we're only really in a position to make this an attractive offer for those in the continental United States (where we can offer shipping for free). We *do* ship internationally, but between the shipping prices and shipping times, it's probably not the best offer you can find - though this may depend. We also straight up can't ship to the UK, thanks to some fairly new restrictions they've put into place relating to their Brexit transition. I know that's a bummer - I'm Canadian myself - but hopefully one day we can expand things more meaningfully to the rest of the world.

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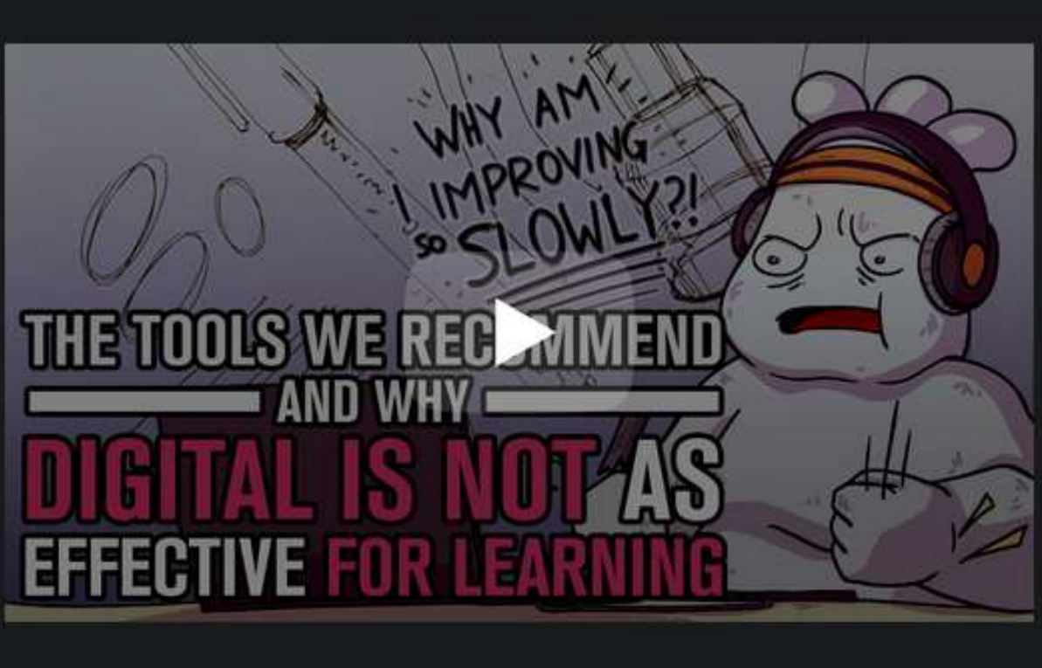
Lesson 0: Getting Started

Required/Recommended Tools

Hate to read? No problem. **We can read the text to you**.

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!


WHY AM I IMPROVING SO SLOWLY?!
THE TOOLS WE RECOMMEND
AND WHY
DIGITAL IS NOT AS EFFECTIVE FOR LEARNING

The tools we recommend and why

We've explored what this course is about, what it teaches, and how to get the most out of it. Now it's time to talk about one last major topic: tools.

This video, and the content below, explores what kinds of tools we use throughout the course - and more importantly, *why*.

Why ink? Why not digital?

This is probably one of the most contentious questions we get, as many of our students aspire to become digital artists. That's a goal I can certainly relate to - I myself have done all of my professional work digitally, and I even spent about ten years using digital tools to learn (between ages 13 to 23). I *love* working digitally.

Here's the thing - digital tools, and computers in general, exist for a singular goal: to make you faster and more efficient. Whether it's to write essays for school, pay your taxes, calculating the six hundredth decimal of pi, or creating an illustration, digital tools will allow you to complete your task more quickly. In the context of producing work for a client or employer, this translates to *more money*. The less time we spend, the more work we can get done, and thus the more value we can offer and the more we can be paid in return.

For that very same reason, I have found both in my own experience and in teaching other students, that digital tools have the opposite effect when we're learning. **Learning is not about being fast**. Learning is about taking our time, and both analyzing and understanding the motivation and reasoning behind the actions we take. It *demands* that time be invested, and while there are certainly things we can do to spend that time more effectively, tools that are designed to make you go faster will, by that same design, be more likely to cause you to rush, and to spend that time far less effectively.

Of course it's possible to learn using digital tools, but it's more of an uphill climb. While you may make a point of forcing yourself to take your time, there will always be those moments where you lose focus and slip back into following the nature of the tool.

Ink on the other hand - specifically the fineliner pens we use here - has a number of very useful qualities:

- It makes it much harder to draw loosely and thoughtlessly. Every action you take is plainly visible with a dark stroke on the page. This forces us to slow down and consider what we're doing before putting those marks down. We can certainly still rush, but it very quickly becomes an unsustainable approach, forcing students to correct that behaviour.
- It skips over a lot of the little hiccups we can run into when dealing with electronic hardware and software. A tablet needs to translate the physical action you're performing when drawing into signals that then tell the software what to display. There are countless things that can get in the way and cause both the hardware and software to behave incorrectly - bugs, driver conflicts, the specifications of your computer, and so on. All of this can be overcome, but it can be very frustrating for a beginner to navigate.
- Depending on the tool you use, you may have different ways in which you can vary the marks you make. Some tools vary in different ways - drawing more heavily or lightly to make darker or fainter marks on the page, changing the angle of the stroke to create broader or narrower marks, and so on. The pens we employ here - which I'll expand upon a little further down the page - really only vary in one way: the thickness of the stroke. Applying less or more pressure will create a thinner or thicker stroke, while that stroke will continue to remain rich and dark (assuming it's not running dry, anyway). This helps us train our pressure control more naturally, which itself is a very useful skill to learn if you plan on working digitally later on.

Pens - Fineliners, size 0.5

So! Here's our daily driver - the 0.5mm fineliner. They produce a dark, rich stroke, and allow a fair bit of variation in width by varying pressure - although they can be a bit fragile, so avoid pressing too hard on them, as this can damage the tip and impede ink flow.

There are *many* different brands of fineliners out there, covering a wide range of prices and qualities. For the purposes of Drawabox you do *not* need to get something expensive, although it is worth considering that the cheaper pens are generally more fragile, and have ink that won't last quite as long. This can still be an advantage if you're still getting the hang of controlling your pressure (if you're prone to damaging them, better to have pens that aren't going to last that long anyway, but also won't cost you a ton).

While the 0.5mm size is ideal, you'll be okay with anything within the 0.4-0.6mm range. Also, different brands will have nibs that either more firm or more flexible, so there are some discrepancies, with a more flexible 0.4mm tip actually making thicker marks, and a 0.6mm stiffer tip producing thinner marks.

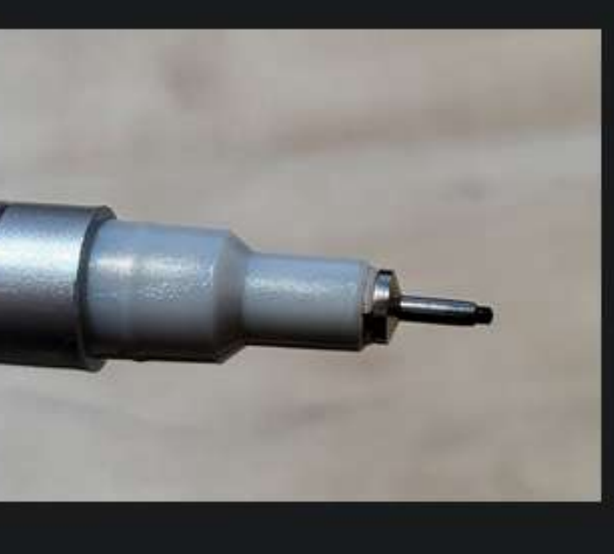
A lot of brands will sell their pens in multi-size packs for cheaper, but I recommend avoiding these if you can, unless you plan on using the other sizes in other projects. If possible, try to get packs that contain multiple pens of the same size. A lot of art supply stores also sell their pens individually, and even allow you to test them out - something that is especially advantageous when you're going to an actual store, because duds - that is, pens that have dried ink, or for whatever reason don't work right - are definitely a problem when it comes to buying pens.

Here's a rundown of some common brands, although there are a lot out there. You'll also find a review of *many* different brands on this playlist from ScyllaStew's YouTube channel - she spent half of the 250 Box Challenge testing out different pens for each page, and reviewing how they performed.

- **Sharpie**. Sharpie makes pens that are fairly widely available and quite cheap. The two of theirs that are suitable for Drawabox are the Sharpie Ultrafines and the Sharpie Pens. The Sharpie Ultrafines are a bit thicker, and the Sharpie Pens are a bit thinner, but they're some of the cheapest pens you'll find. Sharpie also produces a set of coloured pens that can be useful in the exercises where we analyze our work.
- **Sakura**. Their Pigma Micron's 08 size fineliners are commonly used. While not the cheapest, they are on the lower end of the price spectrum. Their Pigma Micron PN pens are technically not fineliners, but they'll also work for our purposes here.
- **Staedtler**. These are on the pricier end, but they're also the pens I generally gravitated to when learning. In my experience, their Staedtler Pigment Liners are quite resilient and last a good while.
- **Faber Castell**. Their PITT Artist Pens are generally quite high quality, with archival india ink - but they are quite expensive as a result. I find it hard to recommend these - they're great pens, but for Drawabox, they offer a lot of things we don't really need to worry about. If you do get these, be sure to pick up their "F" size.

Keep an eye on the nibs

If you're uncertain about whether or not a pen is a fineliner, take a close look at the actual tip of the pen. It should look like this, with a metal tube tipped with a little bit of plastic, which absorbs the ink and applies to the page.



Drawabox sells pens too!

There are a lot of challenges when it comes to finding pens - they're expensive, they come in those annoying packs with different sizes, and as I mentioned above, sometimes you get pens that don't work right. In the last few years, we've been importing and selling pens ourselves in an attempt to address this problem.

You can find them here. We sell them in packs of 10 for $17.50, with free shipping in the continental United States. We also hand-test them on the back of a Drawabox sticker before shipping them out, and include that sticker with the pack, so as to bring down the chance that you'll get a dud.

What about other kinds of pencils, pens, etc?

Every tool has its strengths and its weaknesses, making it better in some cases and worse in others.

Why not pencil?

> Pencil allows students to sketch very lightly on the page, effectively combining the "thinking" and "doing" into one step. For the specific concepts Drawabox teaches, this isn't ideal. Instead, we want to focus on tools that force students to think first, *then* act. There are plenty of other teaching methodologies, and even topics that benefit from this aspect of pencils, so they're by no means a bad tool - just not a good fit for what we do here.

What about ballpoint?

> Ballpoint is like the pencils of the pen world - but they're not all bad, and we actually do use them later in the course, for Lesson 6 onward, where students have had ample opportunity to learn to think before they act, but where the permanence of ink is still important. Those later lessons get *very* complex, to the point that the heavy weight of fineliners becomes just a little too burdensome, so we actually encourage switching to ballpoint pens at that point. We also allow students to use ballpoint pens through Lesson 1 and the 250 Box Challenge, but we'd still prefer that they use fineliners. The expectation is that if you're using a ballpoint in Lesson 1, that you're working at getting your hands on some proper fineliners.

Technical pens?

> Here's where it can get kind of confusing. Depending on where you live, technical pens *may* be another word for "fineliner", but they can also refer to a similar type of pen that has a full metal nib. The latter kind is designed to produce a stroke of a highly consistent thickness, whereas fineliners have more give in their tips, allowing them to produce a more variable line thickness.

Fountain pens? Dip pens?

> The main issue here is that these kinds of pens have a much steeper learning curve, compared to fineliners. Also, not all fountain pens and dip pens are the same - some nibs are designed to create consistent lines, others will flex more to provide variable stroke widths. While you can definitely find pens of this sort that will mimic the behaviour of fineliners, the risk is that students sometimes happen upon them in their parents' old abandoned writing tools, but not actually have prior experience in their use. In trying to use them for this course, that would introduce a pretty significant additional challenge which would serve as a distraction.

And gel pens?

> Gel pens are a type of ballpoint pen that have a much richer, darker, more consistent ink. Like ballpoint pens, they're allowed for Lesson 1 and the 250 Box Challenge, but with the expectation that you're still working to get fineliners. The main difference between gel pens and fineliners is that the fineliners allow for more variation based on pressure.

Keep in mind - we are not using pens because I'm trying to teach you how to work with ink. Ink is a complex medium of its own, and one I honestly know very little about. What we're learning here, as discussed earlier in this lesson, is very limited. To draw marks with confidence, and to understand how the things we draw exist in 3D space, rather than just as lines on a flat page.

That means that you're still going to want to learn, either through courses or targeted practice, about whatever other tools you plan on using. Just as digital tools require you to learn the ins-and-outs of each piece of software and hardware, any other traditional medium will require the same.

Here are a few from our sponsor, **New Masters Academy**, that might be of interest:

- Introduction to Materials with Sheldon Borenstein
  This one's really a big overview of many different traditional tools and mediums - from graphite, to charcoal, to markers and more.
- Introduction to Inking with Miles Yoshida
  Even though Drawabox has you use ink, that doesn't mean we teach you much about its use. Miles Yoshida demonstrates the wide variety of tools that fall under the "ink" category (as well as some that can be used wonderfully alongside it), and will introduce you to a whole new world of creativity.
- Introduction to Photoshop with Chris Legaspi
  Personally, as I am strictly a digital artist myself, Adobe Photoshop is my tool of choice. It's not the *only* tool out there (with Clip Studio, Krita, and others gaining steam), but it's still holding firm to the title of "industry standard". In this course, Chris Legaspi explores every corner of Photoshop, from sketching and painting from scratch, to retouching photos, and more.

Sign up to New Masters Academy with the coupon code **DRAWABOX22** — you'll get a full **35% off your first billing cycle**.

Paper

All I ask is that you don't draw on lined paper... or like, napkins. In fact, above all else, I highly recommend using regular printer paper. It's a great size (A4, 8.5"x11") and will allow plenty of room to think through spatial problems (as you get smaller and more cramped, this can become a problem), it's not going to fold back over while you're drawing like a sketchbook might, and it's not going to leave you feeling afraid of ruining a sketchbook.

If you insist on using something fancier, try not to go too small, and if it's a sketchbook, ringed is better as it lets you fold the pages back and get them out of the way. But really - **there's no good reason for you to use anything other than printer paper**. If you want to produce a 'record' of your progress and growth, you can always collect those pages, then take them to a print shop later to produce them into a physical book of some sort. It's not a desire that should be changing how you work through this material, however.

Also, another thing to keep in mind is that **you should not be using ink on paper made for graphite or charcoal**. Paper more similar to printer paper (which, again, is the ideal choice for these exercises) is great, but anything rougher and with more tooth to it will drain your pens' ink more quickly.

Other tools

Certain lessons and exercises will require other tools as well, ranging from simple rulers (generally you can use any sort of straight edge) to ellipse guides and french curves in lessons 6 and 7.

Ellipse guides/templates come in sets and can get expensive, but you can usually shop around online and find them for cheaper on places like eBay. They are extremely useful, however I wouldn't recommend buying them until you've actually reached those lessons. Once you do, they are a sound investment.

There are also "master ellipse templates" which are essentially a single ellipse guide featuring ellipses of several different degrees, but limited to a few smaller sizes. These are generally adequate for Lessons 6 and 7, and are *way* cheaper. You'll find one listed in the recommendations page.

Beginner's shopping list

If you're planning on going to the store (or hopping onto the internet to do some online shopping) specifically for supplies to jump into this course, here's a quick list of things you'll want to pick up. Some are required, others can be improvised with other things you'll probably have at home. You can think of this as a summary of what's explained above.

- 0.5mm Fineliners, **highly recommended**, and required if you're submitting for official (paid) critique. If you for whatever reason can't get your hands on them immediately, don't worry - you have time. You *can* use a ballpoint pen for Lesson 1 and the 250 Box Challenge, but it is best that you use a fineliner as soon as you can, and that you have one before starting Lesson 2. If you can't find a 0.5mm specifically, try and stay within the range of 0.4-0.6.
- A4 (8.5"x11") Printer Paper, **highly recommended**. This really is the best option for paper. **Do not** use sketch paper or other paper intended for dry media. It will drain your pens and hinder you as you draw.
- Ruler. Any straight edge will do, but you'll want something the length of your page that allows you to draw precise, straight lines for the parts of exercises that require it.
- Coloured Pens. This isn't necessary, and when they come up in the lessons all that matters is that you've got something to draw with that is easily distinguishable from your main fineliner/pen. It's primarily for the purposes of analyzing our work after the fact so we can identify where we need to focus our efforts as we continue forwards.

<<< Using this Course
Lines, Ellipses and Boxes >>>

The Art of Brom

Here we're getting into the subjective - Gerald Brom is one of my favourite artists (and a pretty fantastic novelist!). That said, if I recommended art books just for the beautiful images contained therein, my list of recommendations would be miles long.

The reason this book is close to my heart is because of its introduction, where Brom goes explains in detail just how he went from being an army brat to one of the most highly respected dark fantasy artists in the world today. I believe that one's work is flavoured by their life's experiences, and discovering the roots from which other artists hail can help give one perspective on their own beginnings, and perhaps their eventual destination as well.

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VIEW HOMEWORK SUBMISSIONS
SUBMIT HOMEWORK FOR REVIEW

Some Quick Reminders
- Video vs. Text
- But Comfy! I have trouble with reading!

Lines: Using Your Arm
- Drawing from your wrist and shoulder
- Old habits
- The pivots of the arm
- Let's keep it simple
- Do you mean I can't ever draw with my wrist or elbow?
- The path of least resistance
- Hover-hand
- How to hold your pen

Lines: Markmaking
- The Principles of Markmaking
- Marks should be continuous and unbroken
- But that artist uses chicken scratching all the time!
- Marks must flow smoothly
- Marks must maintain a consistent trajectory

Lines: Homework
- Don't forget!
- Homework and exercises

Ellipses
- What is an ellipse?
- 2D vs 3D
- Circles in 3D space
- Degree
- Degree shift
- Minor axis
- Normal vector
- Cylinders
- Homework and exercises

Boxes: The Basics of Perspective and Projection
- Boxes and perspective
- Not a perspective course
- 2D vs 3D
- Projection

Boxes: Foreshortening and Vanishing Points
- Conveying distance
- Foreshortening
- As things move farther away, they appear smaller
- Vanishing points
- As applied to a box
- Horizon line
- What happens when a set of edges rotates?

Boxes: Rotation, Perspective Grids, and the Concept of Infinity
- Understanding rotation
- How we look at the scene
- A different point of view
- Circular horizon
- Infinite vs non-infinite
- Vanishing point at infinity
- 0 point perspective does not exist

Boxes: Simplified Guidelines
- 1 point perspective simplified
- 2 point perspective simplified
- 3 point perspective simplified

Boxes: Additional Notes
- Foreshortening
- Horizon line, eye line, axis
- Distortion
- Placing vanishing points

Boxes: Homework
- Homework and exercises

What Next?

Lesson 1: Lines, Ellipses and Boxes

Some Quick Reminders

LISTEN WITH DRAWABOX

Hate to read? No problem. **We can read the text to you**.

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

If you haven't yet read through Lesson 0, you absolutely should before moving forward. It covers important information on how these lessons are meant to be used, and highlights common pitfalls many students encounter that can hinder their progress as they move forwards.

Video vs. Text

As you may have noticed, Drawabox is presented in both videos and text. This is because the content we teach here is *dense*, and it helps students to absorb the material when it is delivered in multiple formats.

While we are working to make the videos more concise and to touch on all the same major points in both text and video format, as of February 2021 we are only just beginning revising the video content. Most of the videos are older - some by a year, some by a few - and many of them are not as up-to-date as the text content. They are still useful, but should not be treated as a replacement for the text.

Even when the videos are fully updated however, there is immense value in absorbing the material in different formats. Our brains easily become complacent, so going through it in multiple formats is more effective, even than just rewatching the same video several times.

Expect to both watch the videos and read the text, in order to get the most out of this resource.

But Comfy! I have trouble with reading!

LISTEN WITH DRAWABOX

Between June and December 2021, we worked with Audiblogs, an awesome startup that allows you to turn websites and articles into audiobooks, using neural network driven text-to-speech. They provided audio versions of our first lesson as a free preview, then charged a small monthly fee to access the others, to help with their bandwidth costs.

Since then, we've amicably ended that partnership (you should still check them out) - but worry not! **We've implemented the feature ourselves and are providing it completely free**. We're going to keep an eye on how much it costs to provide, but we would like to keep it free into the future, if it continues to be feasible to do so.

So! Feel free to click the "Listen with Drawabox" button at the top of each article to have the content read to you. You can also hit the little play button on the right of each bookmarkable section, or use the bookmarks right on the player to jump to a specific section.

So- if you've read through all of Lesson 0, are ready to follow the instructions of the tasks laid before you, and to both watch the videos and read through the text, let's get started. You can click the link at the bottom right of the page to move onto the next section.

Lines: Using Your Arm >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Faber Castell PITT Artist Pens

Like the Staedtlers, these also come in a set of multiple weights - the ones we use are F. One useful thing in these sets however (if you can't find the pens individually) is that some of the sets come with a brush pen (the B size). These can be helpful in filling out big black areas.

Still, I'd recommend buying these in person if you can, at a proper art supply store. They'll generally let you buy them individually, and also test them out beforehand to weed out any duds.

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  But Comfy! I have trouble with reading!
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  Drawing from your wrist and shoulder
  Old habits
  The pivots of the arm
  Let's keep it simple
  Do you mean I can't ever draw with my wrist or elbow?
  The path of least resistance
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Lesson 1: Lines, Ellipses and Boxes

Lines: Using Your Arm

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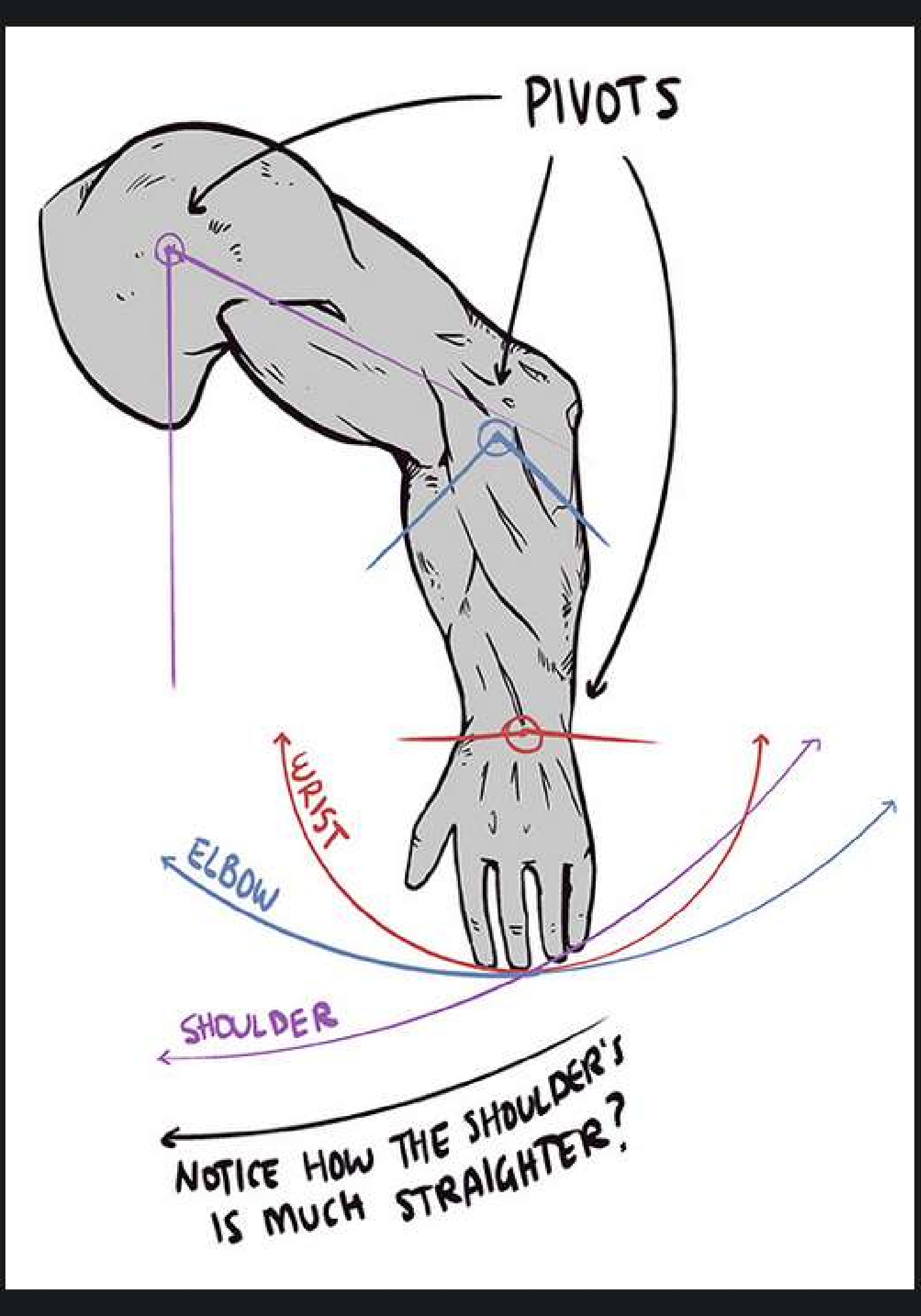
Drawing from your wrist and shoulder

This video demonstrates the difference between drawing from your wrist, elbow, and shoulder, the benefits of each, and why in this course we focus primarily on drawing from your shoulder.

As always, watching the video first, then later reading through the text will help you absorb the material more efficiently than just doing one or the other. Don't be afraid to come back and rewatch or reread material either, to help refresh your memory later on.

Old habits

Thanks to the importance of literacy in our society, and the fact that handwriting is still an important skill in our day to day lives (at least for now), most students equate the mechanics of drawing to those of writing. We use pencils and pens, pushing the tip into the page, and we move our hand from the wrist to write. This is very effective for creating the tight twists and turns necessary for small letters, but as soon as we try to draw longer, smoother lines, we start to run up against its limitations.


PIVOTS
WRIST
ELBOW
SHOULDER
NOTICE HOW THE SHOULDER'S IS MUCH STRAIGHTER?

The pivots of the arm

As you likely know by now, your arm has three major joints, and when we hold an object in our hand, we can manipulate the position of that object in space by bending our hand at any of the following pivots:

- Wrist
- Elbow
- Shoulder

The specific pivot you choose will determine the range of motion you can achieve. Moving from the wrist will only allow you to move across a more limited distance, and will quickly start following a very obvious arc.

Moving from the elbow, and even moreso from the shoulder, will allow you to maintain a straighter trajectory longer before the arc of the motion becomes more obvious.

Let's keep it simple

For the sake of simplification, we can ignore the elbow, and focus instead on the idea of either:

- **Drawing only with your wrist**, where your hand moves but the wrist remains pinned in place. This allows us to have very tight, stiff control, and it's good for tight details and writing.
- **Drawing with your *whole* arm**, where everything, including your upper arm, is moving as you draw. This is great for smooth, fluid linework, even when drawing smaller marks, because it emphasizes a consistent trajectory and minimizes erratic wobbling.

Do you mean I can't ever draw with my wrist or elbow?

That's not what I'm saying at all.

Every pivot serves its purpose, and while the majority of this course will focus on marks that need to achieve a smooth, confident flow (which is best achieved from the shoulder), there are situations where you'll use your wrist. For example, in the few areas where we delve into texture, the wrist's capacity for stiff precision will be an advantage.

And of course, when doing your own drawings outside of Drawabox, you're welcome to draw however you feel most comfortable. The rules presented here apply only to work done for this course. You'll be able to choose which parts you want to use outside of it yourself.

The path of least resistance

Drawing with your whole arm is, frankly, difficult. Or more accurately, it's unfamiliar and unpracticed. We've spent years writing from our wrists, and so the muscles involved are far better developed than those needed to draw with your entire arm. As such, we end up facing more resistance, especially as beginners, when we try to use it. It gets exhausting, and we get sore quickly. That muscle weakness can also make it harder to be confident with our linework.

That's why when we face the choice of how we're going to use our arm to make a mark, when we're faced with two paths to choose from, using our whole arm poses far more resistance. We naturally want to go down the easier road, to draw in the familiar fashion, from the wrist. **It is for this reason that this course forces you to draw from your shoulder in most cases**.

I cannot stress this enough: **be patient with yourself**. Do not rush, do not force yourself. Take breaks, and allow the work to take as long as it needs to. You only have one body, and to break it so early would be a tragedy.

Hover-hand

Resting some part of your arm on the page is a pretty normal thing people do, as it provides additional support and helps us draw for longer without as much fatigue. This can result in more friction and dragging, however, which can make it easier for us to fall back to drawing from certain pivots and not engaging our whole arm.

Gently resting the side of your hand or a finger on the page as you draw is fine. It will drag a little, but as long as you're aware of it and catch yourself whenever you slip back to drawing from your wrist, it'll be okay. The added support is well worth it.

Resting your elbow against the table as you draw however is not a good idea. It creates a very heavy anchor that basically forces you to draw from your elbow and freezes your whole upper arm. Avoid this wherever possible.

Drawing with your whole hand and arm hovering will result in no such dragging or friction, but it's not always worth the exhaustion especially as we're still developing our shoulder muscles. You may want to practice this in the future, but for now, don't worry about it.

How to hold your pen

Some people are familiar with the 'overhand' grip one might use when drawing with a pencil, or painting with a brush. While it is often presented as "the correct grip that no one taught you!" it isn't as simple as that.

The grip serves a function. Pencils for example can be used to make marks from the tip as well as from their side edges, and often you'll see artists exposing more of their pencil's lead to get more of those broad, flat sides. Using an overhand grip allows us to access those surfaces more easily while drawing.

Pens on the other hand have just one point of contact - the tip - and we can vary our mark through the pressure applied to it. For this, the tripod grip-type (which is basically how you hold your pen when writing) is more suitable, and is how you should be holding your pen when drawing as well.

If you're interested in learning more about different tools and the way in which they're best used, check out this course from our sponsor, **New Masters Academy**:

- Beginner's Guide to Drawing with... everyone, it seems!
  This course, which is a collaboration between some of the biggest names in art instruction, serves as a one stop shop for one's traditional drawing fundamentals. They introduce you to a variety of tools, explaining each one's use, and push through concepts like value scales, perspective, light and shadow, texture and markmaking, figure drawing, and more. With just short of 24 hours of video, they cover a lot, but they do so in depth, and provide 23 exercise-based assignments to complete.

Sign up to New Masters Academy with the coupon code **DRAWABOX22** — you'll get a full **35% off your first billing cycle**.

<<< Some Quick Reminders **Lines: Markmaking >>>**

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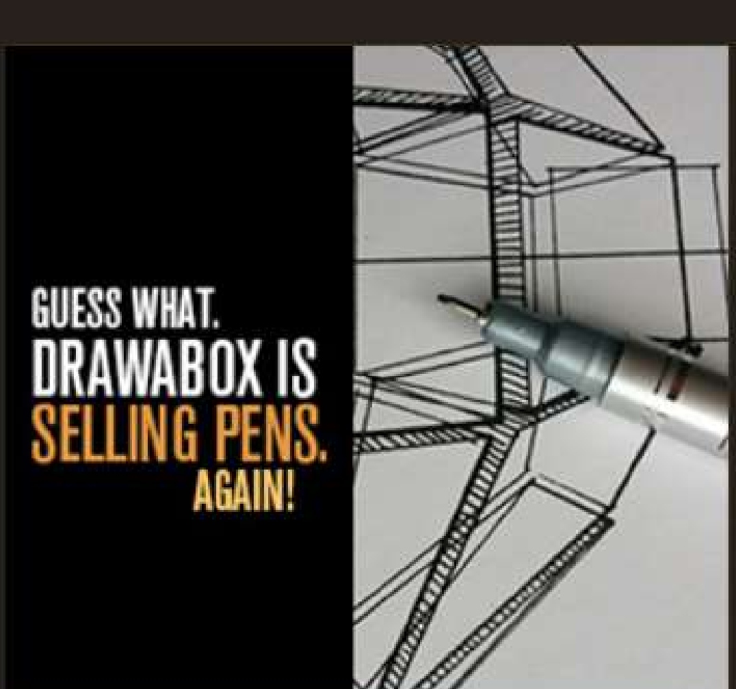

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Lesson 1: Lines, Ellipses and Boxes

Lines: Markmaking

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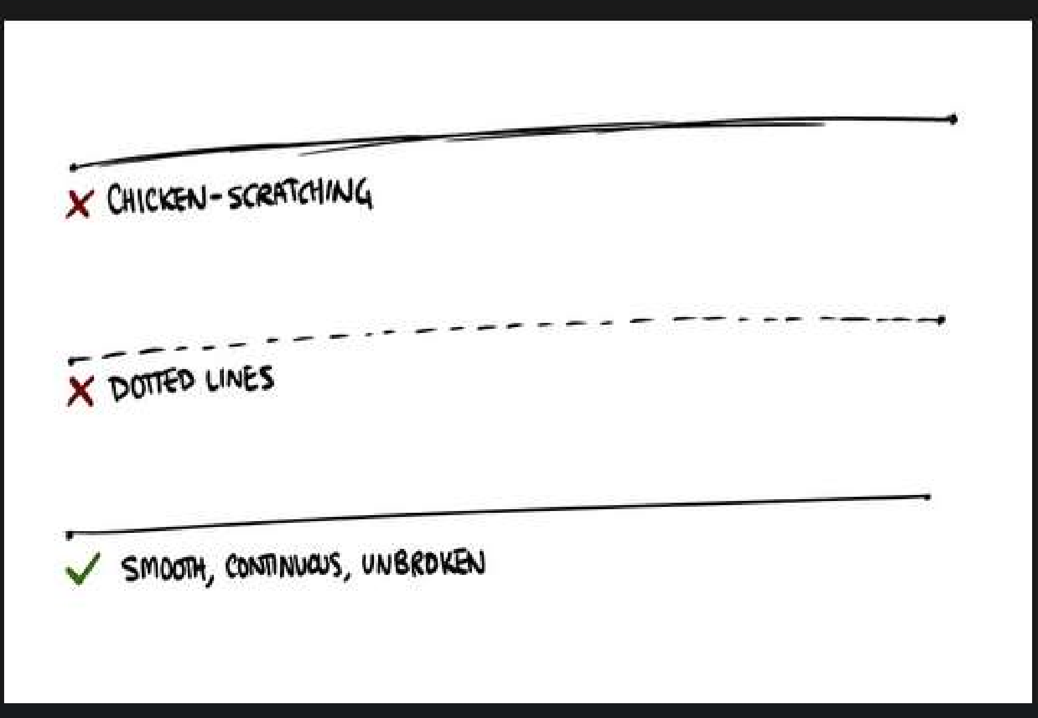
The Principles of Markmaking

When it comes to the marks you draw, there are three overarching rules:

- Marks should be continuous and unbroken
- Marks should flow smoothly
- Marks must maintain a consistent trajectory

Let's look at each of these in more detail.



Marks should be continuous and unbroken

This essentially means that every line we draw should consist of a single mark. Beginners, due to their heavy reliance on drawing from their wrist, tend to make very short marks. When they want to achieve a longer stroke, they'll draw a lot of overlapping marks, building that line up gradually in what is known as "*chicken scratching*".

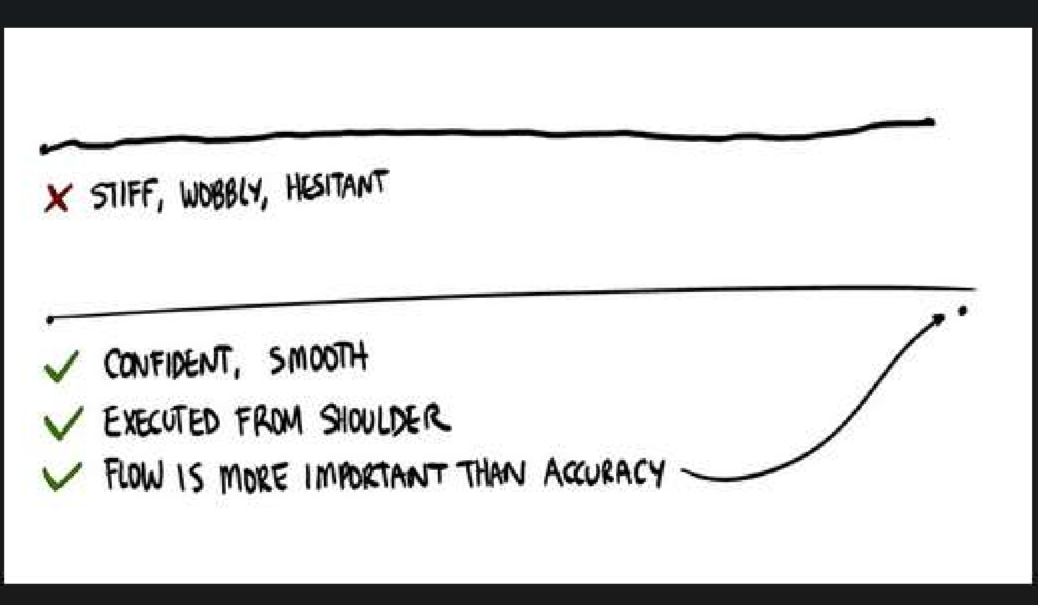
In other cases, students may find situations where they want to represent certain lines in dashed or dotted lines (for example, if we're drawing "through" a box, as though we have x-ray vision, we may draw the edges on the opposite side of the form in such a way).

Neither of these strategies should be employed during this course. Every drawing here is an exercise, and one of the overarching goals is to help train you to be more confident and purposeful in your marks. This means executing every line in a single, intentional stroke.

But that artist uses chicken scratching all the time!

Some students do ask, "I see other artists using chicken-scratch when they sketch, why can't I?" It's an entirely fair question. The answer comes in two parts:

- Firstly, there's a difference between what a student who simply doesn't know how to make marks any other way "chicken scratches" - where it's erratic, unplanned, and poorly thought out, and what a trained artist will do. An artist who does so out of choice will generally show far more intent and control behind their marks, and when they *need* to make longer, more fluid marks, they will be capable of doing so.
- Secondly, as mentioned above, every drawing we do in this course is an *exercise*. In this case, we're specifically training you to think through your marks, to execute them purposefully, so you can gain the level of control and forethought that other artists exhibit. When you draw for yourself, you're welcome to do so however you want - but the habits you learn here will, gradually, bleed into how you approach drawing in general.


✗ STIFF, WOBBLY, HESITANT
✓ CONFIDENT, SMOOTH
✓ EXECUTED FROM SHOULDER
✓ FLOW IS MORE IMPORTANT THAN ACCURACY

Marks must flow smoothly

The act of drawing a line has two main challenges:

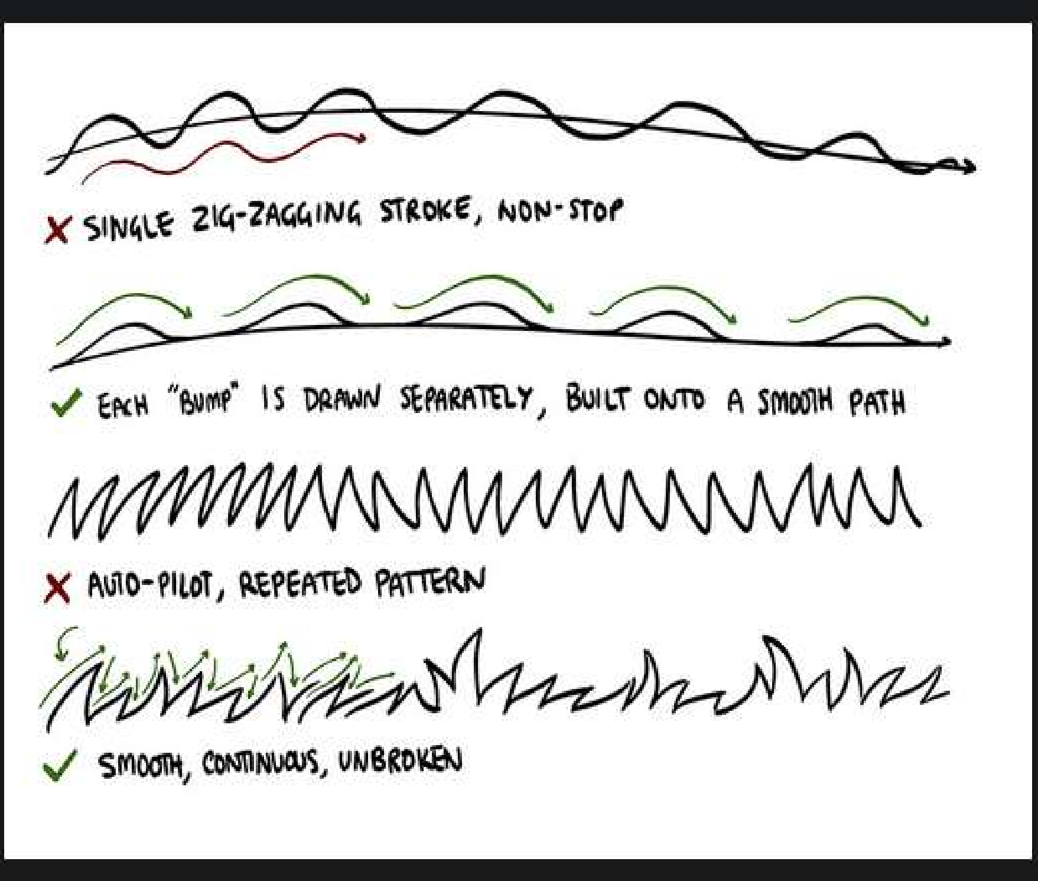
- We want to draw our lines to be accurate
- We want to draw our lines to be smooth

Beginners often prioritize accuracy first, thinking that it's more important that their lines reach their intended points - but this is incorrect. **The most important thing you need to focus on first is keeping your marks smooth and consistent.**

The reason is simple: we can generally execute pretty smooth marks now, by simply changing the way in which we approach the task. If we draw as confidently as we can, without concern for where we want the line to fall, our marks will always come out smoothly - just not accurately.

Smooth flow is something we achieve by the approach we employ. Accuracy on the other hand is something that will improve with practice. Nail down your confident stroke now, from your shoulder, and as you practice it, your accuracy will catch up as well.

If you do the opposite, focusing on accuracy now, it will be vastly more difficult to make those marks smooth with practice. It may work eventually, but I wouldn't want to wait around to find out.


✗ SINGLE ZIG-ZAGGING STROKE, NON-STOP
✓ EACH "BUMP" IS DRAWN SEPARATELY, BUILT ONTO A SMOOTH PATH
✗ AUTO-PILOT, REPEATED PATTERN
✓ SMOOTH, CONTINUOUS, UNBROKEN

Marks must maintain a consistent trajectory

There are a lot of situations where you want to capture something that has a repeating pattern. When doing so, don't attempt to capture it all at once. Instead of zigzagging back and forth and repeating the same pattern, **break it up into separate strokes, each one with a single purposeful trajectory**.

When dealing with a smoother wave, it's often better to start with a smooth line, and then build individual "bumps" onto it. We'll use this quite a bit in Lesson 3, when we draw the wavy edge detail on leaves.

When drawing something more jagged, like fur, it's important that you purposely design the tufts of fur, making a stroke to go up, a stroke to come back down again, another going up once more, and so on. This allows us to be *intentional* in how we make the marks.

Zigzagging back and forth, on the other hand, will cause us to go into auto-pilot, as all repeating patterns tend to. This will result in the same, boring, flat outcome that will lose all sense of character and intentional control. Avoid it wherever you can.

<<< Lines: Using Your Arm
Lines: Homework >>>

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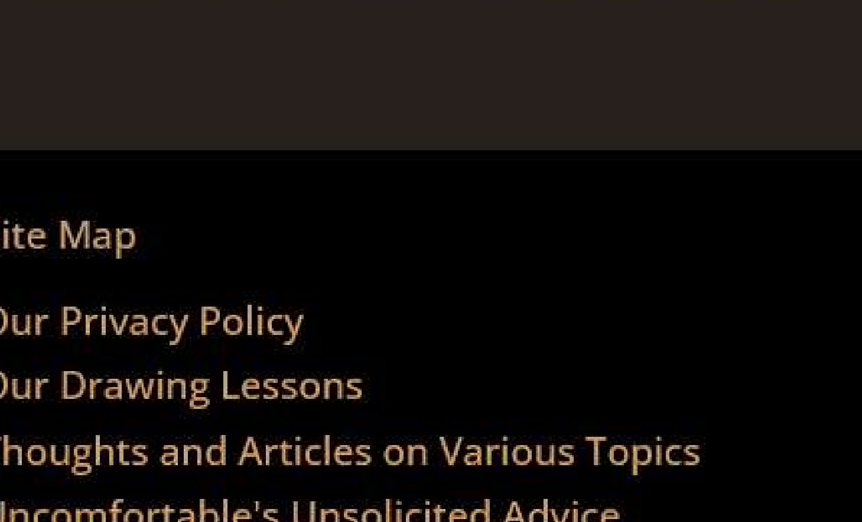
WHAT THE HELL AM I SUPPOSED TO DRAW?!

The Science of Deciding What You Should Draw

Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

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Lesson 1: Lines, Ellipses and Boxes

Lines: Homework

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Don't forget!

Do not grind. Complete the recommended amount of each exercise to the best of your ability and move on. You'll have ample time to keep practicing and improving your skills when doing these exercises as warmups later.

Do not rush. Give yourself the time you need to plan your lines out, to prepare appropriately, and to demonstrate your current best. Every mark is independently important. **Once the ghosting method is introduced in the Ghosted Lines exercise, use it consistently for all your structural marks.**

Read all of the instructions carefully, multiple times if necessary. While I've tried to organize this content in as digestible a manner as I can, there is a lot of information here and there is no way you'd absorb all of it at once.

Take breaks! One day you're going to be a beast who can draw for hours without breaking a sweat, but right now, you need to be patient with yourself and take it all one step at a time.

Homework and exercises

The homework assignment for this section is as follows:

- 2 filled pages of the Superimposed Lines exercise
- 1 filled page of the Ghosted Lines exercise
- 2 filled pages of the Ghosted Planes exercise

Each exercise in the list above links off to more detailed instructions on how they're done.

NOTE: These three exercises constitute just *one* section of this lesson. You should hold onto your homework until you're done **all three sections (lines, ellipses, boxes)**, and **only submit for feedback once they're all done**. You may feel hesitant or uncertain about whether or not you're doing things correctly - that's normal, but it's best you push past the urge to second-guess yourself. Focus on reading the instructions carefully, complete the work, and submit once all of it is complete. This will give others a solid body of work on which to base their feedback, giving you a more useful analysis of what you're doing well and what you may not understand.

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here. In a pinch, I will accept work done in ballpoint, but only if the situation is dire. This is an exception only for this lesson as students get started.

Of course, if you're not planning on making use of the official critique program, then this is a recommendation rather than a hard requirement.

<<< Lines: Markmaking

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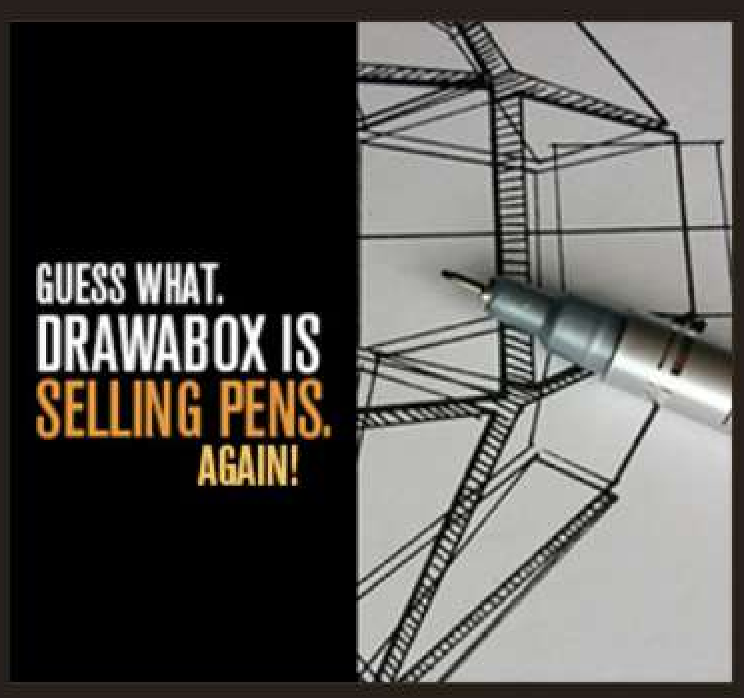

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Boxes: Homework
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What Next?

Lesson 1: Lines, Ellipses and Boxes

Superimposed Lines

Hate to read? No problem. **We can read the text to you**.

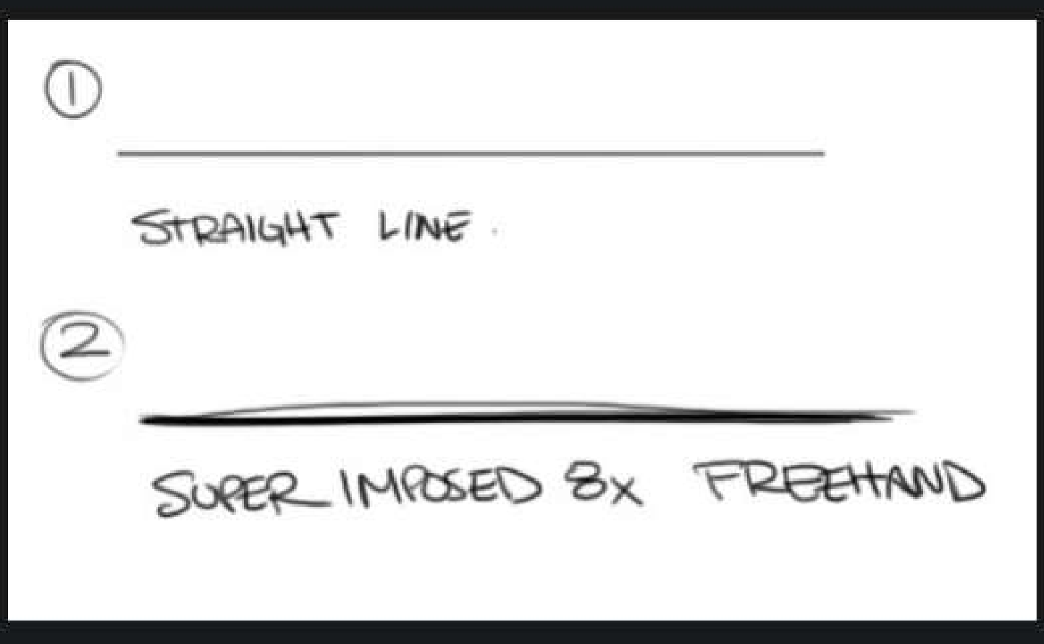
This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

Video instructions

The superimposed exercise is the first one I ever learned from Peter Han - probably before I even took his class, as he's shown it on a few youtube videos as well. It is however important to note that while some of my exercises are based on what I've learned in the past, I'm not always employing them the same way, or with the same focus.

Keep this in mind, in order to avoid any mixed signals. When doing the exercise for Drawabox, follow my instructions even when they stray from Peter's own. When following along with him, do what he says instead.



This exercise is pretty straight forward. As shown here, start out with a simple straight line with a ruler or a straight edge of some sort.

Now, I want you to draw directly on top of that guideline and repeat the stroke freehand 8 times. Pretty simple, right?

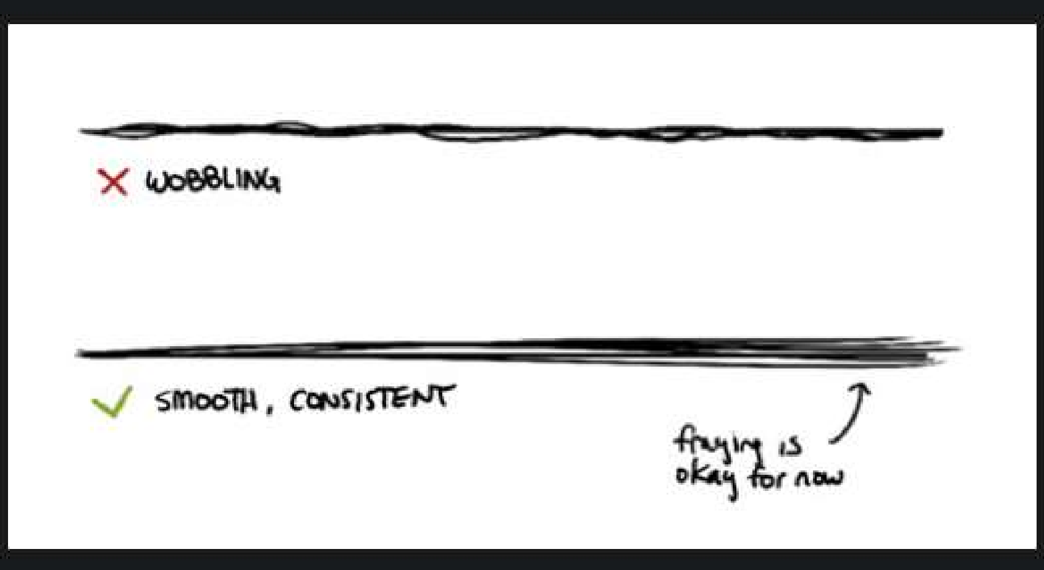
First try it with a relatively short line of a couple of inches. Once you've done a few of these and feel more confident, double the length. Then try half the page, and the full width of the page. As the stroke gets longer and longer, it will get more and more difficult. Also try some arcing lines, and even some waves - though the waves will definitely be very difficult.

The purpose of this exercise

Every exercise has a specific purpose to it, and how you approach it is going to depend on what you're aiming to get out of it. In this case, this exercise is all about confidence. As you draw your superimposed strokes, you will notice that you're not going to be able to see where your pen is drawing, because your hand will be blocking it. This will make it particularly difficult to guide the stroke as you go.

Ultimately, that's the point. If you remember back to the lesson, you're not meant to guide the stroke as you execute it - you need to be pushing forward with a confident, persistent pace, trusting in your muscle memory and letting your arm do what it does best. Some students find that looking towards the end point can help in this regard.

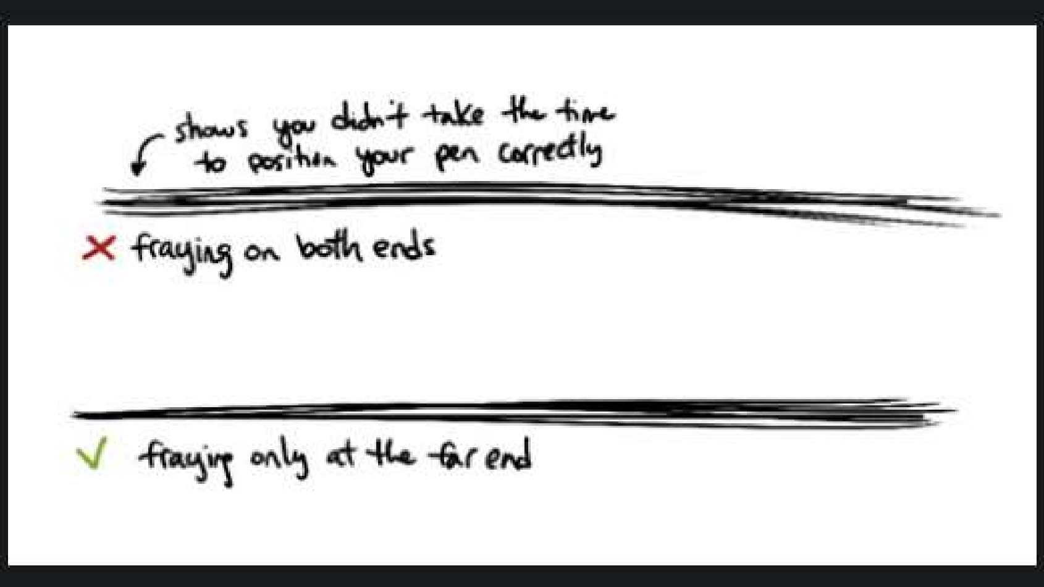
Below you'll find a number of common mistakes I've seen from students over the years.



Mistake: Wobbling

A wobbly line, as shown here, suggests that you're hesitating and not quite giving up control. You're guiding your hand as you draw with your conscious brain, and it's course-correcting as you go (as illustrated in this comic) and causing these wobbles. You need to trust in your muscle memory and allow your arm to do its job.

This will result in what I call 'fraying' on one end (like the fraying at the end of a rope, where the different strokes are separating from the guideline), but this is entirely normal. It will reduce with practice and time, but for now it is something I expect to see and don't regard as a mistake.


shows you didn't take the time to position your pen correctly
✕ fraying on both ends
✓ fraying only at the far end

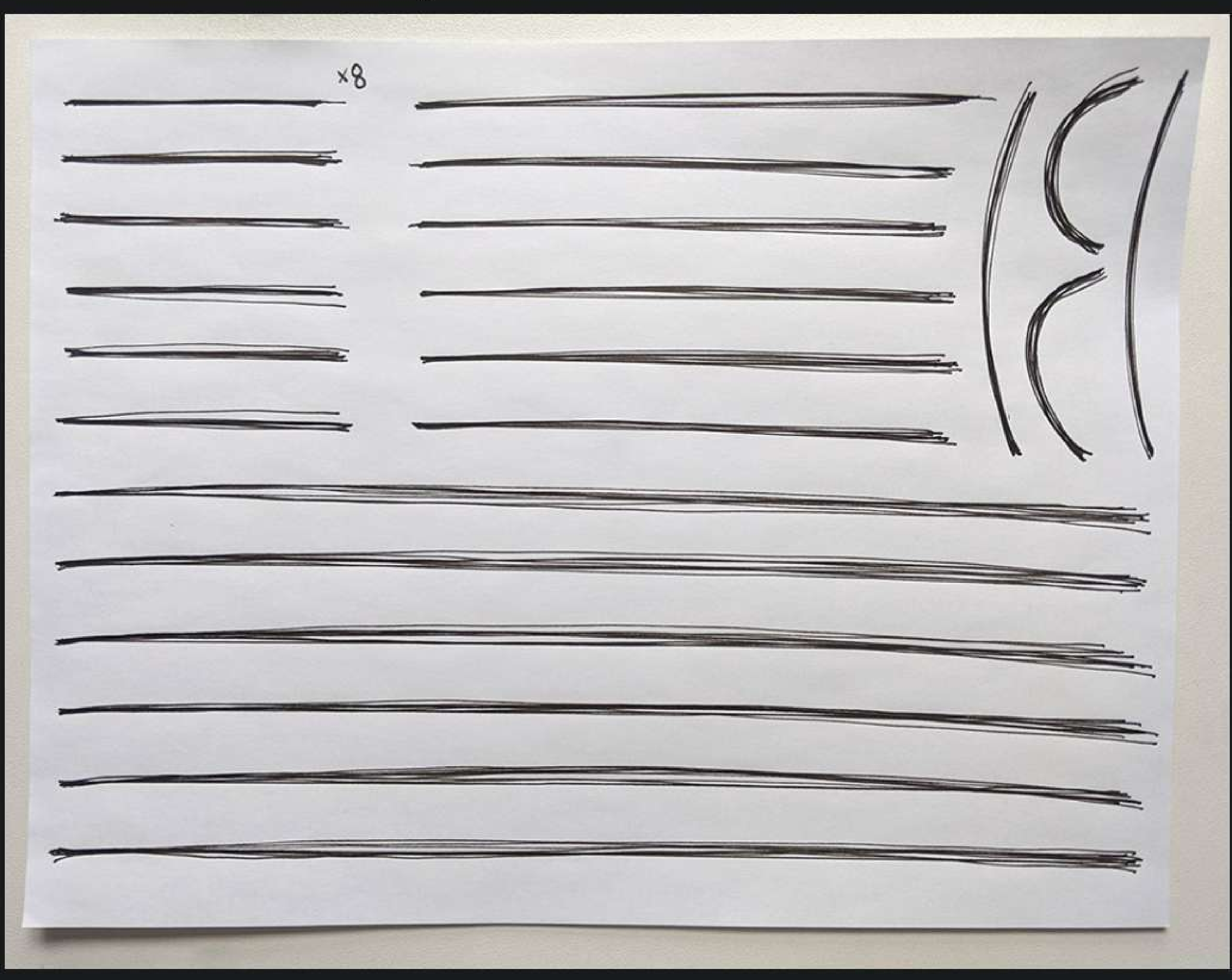
Mistake: Fraying on both ends

As mentioned above, fraying on the far end is normal and expected at this stage. Fraying on both ends however suggests that you're not taking the time to position your pen correctly at the starting point of your guideline, and that you're just kind of 'winging' it.

The thing about confidence is that it's not without its preparation. We draw confidently because we've already done everything we can to assure success - this doesn't mean success is guaranteed, but that there is simply nothing else to be done, and therefore no use worrying or hesitating.

Example homework

Your end result will look something like this.



<<< Lines: Homework

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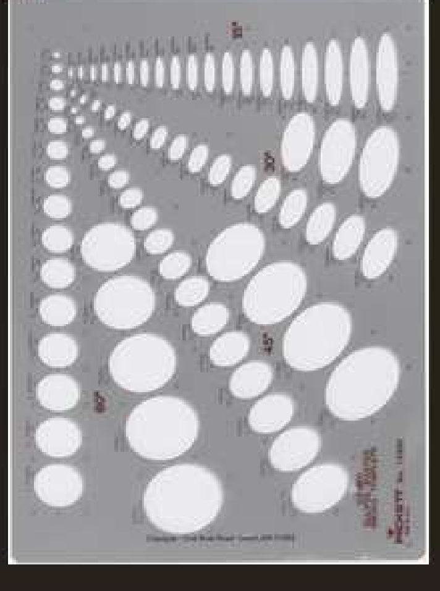

Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.

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Lesson 1: Lines, Ellipses and Boxes

Ghosted Lines

LISTEN WITH DRAWABOX

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DRAWABOX LESSON 1 // EXERCISE 2
GHOSTED LINES
What? I followed the plans. I did my job. Now it's lunch time.

Video instructions

Ghosting lines is a technique I first learned from Scott Robertson (specifically from this DVD from years ago), and it's really become - at least on a conceptual level - the backbone of how I want my students to think.

As you should now be familiar with the concept of executing your marks with confidence, the ghosting method helps us to break the mark making process into a series of steps that allows us to draw with that same confidence, while also improving the accuracy of our results. It also forces us to think and consider our intentions before each and every mark we put down.

Since this technique is all about taking the process of markmaking and breaking it down into three distinct steps, let's look at each one in turn.

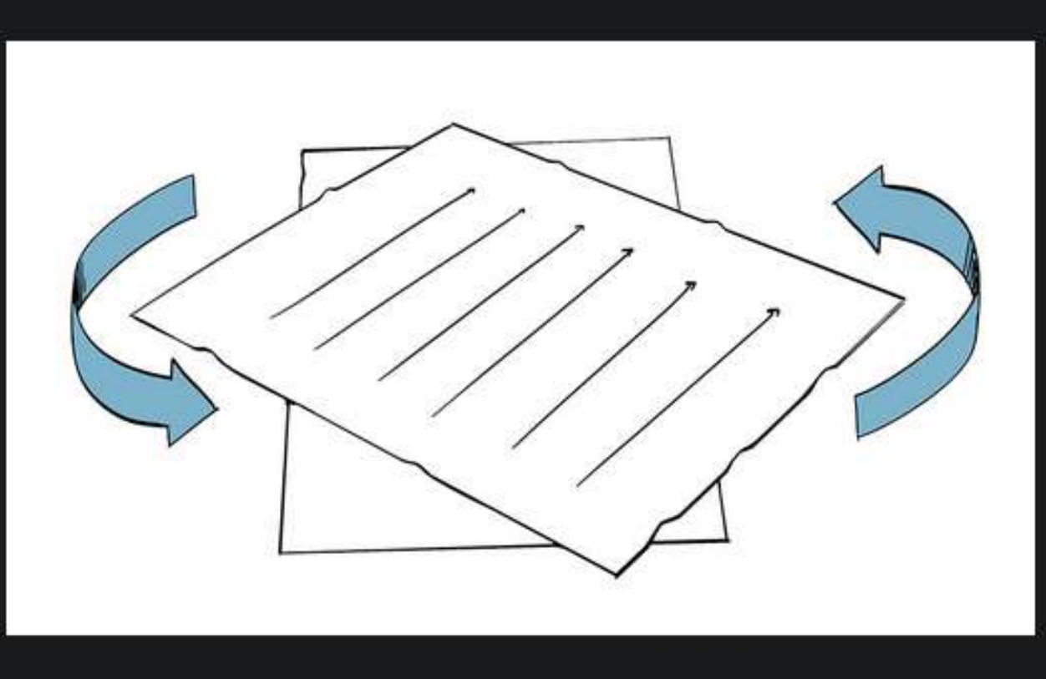
Step 1: Planning

The first step when making a mark is not to jump in and put ink on the page. Beginners will often do this, and for obvious reasons, that impatience leads to poor results.

Instead, we ask ourselves - what kind of mark do we want to make? If it's a stroke that is meant to start and end at particular locations, identify them - even go so far as to mark them down with little points. Identify the path you want the mark you want to follow - but beyond that, **think about the task that mark is meant to accomplish**. Ask yourself what this mark is meant to contribute to your drawing, whether another mark might already be doing that job, and ultimately what you can do to make the mark to the best of your ability.

Rushing in without thinking is probably the most common mistake people make, and it leads to marks that contribute nothing, repeated strokes, and just more chaos on the page.

Remember above all - in this course, **we are not sketching**. We are drawing purposefully, and building things up one step at a time.



Rotating the page

Another important part of the planning phase is rotating your page. You *will* find that executing marks in some directions are easier, and other directions are more difficult. That is perfectly normal.

For now, I want you to rotate the page to ensure that you're always drawing in the orientations that are more comfortable for you.

A better use of your time

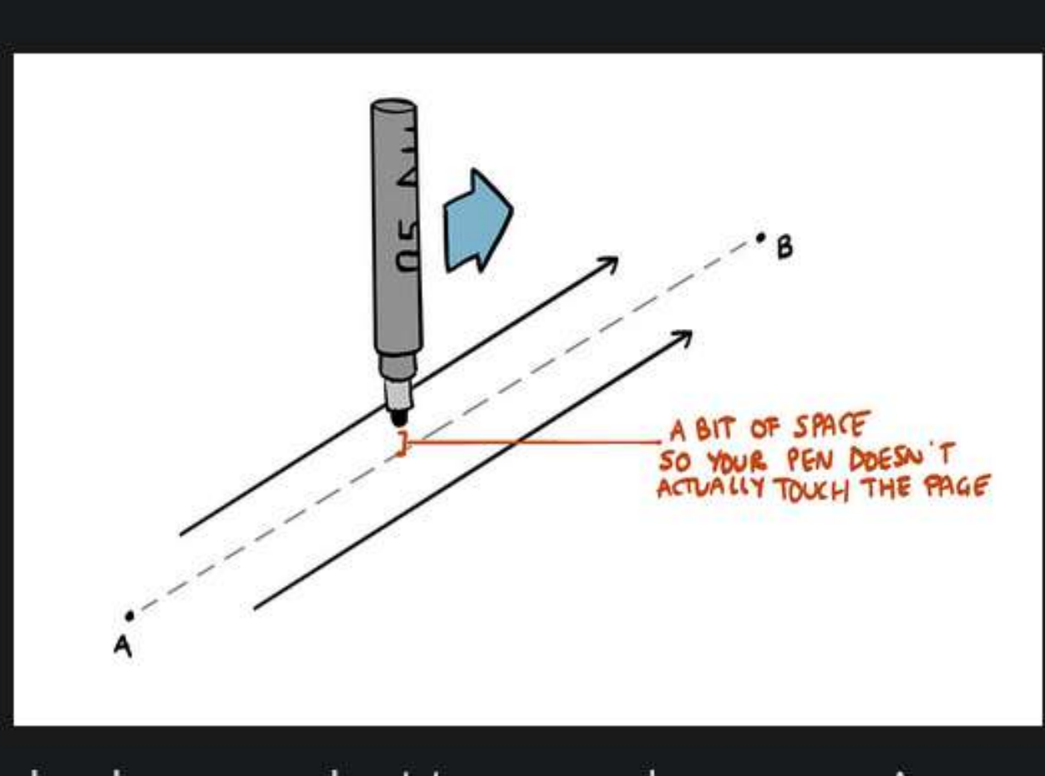
Some may ask, "but then how will I learn how to make marks in every direction, for situations where I can't rotate the page?" This is something you'll learn automatically, over time, and it is also something you can focus on yourself *later*. For now however, if you sit here trying to grind away on this particular issue, you will only hold yourself back from moving ahead onto learning more important and useful skills and concepts.

Step 2: Preparation

Now, when we move onto the next phase, **everything involving planning is now over**. Think of this like a production line, where every phase is handled by a completely different version of you.

Now that we have our marching orders, we set out to familiarize ourselves with the specific motion and movements our body will need to perform to make the given mark.

Make sure you're sitting with a good posture, that you're able to engage your whole arm and start "ghosting" through the mark you want to make.



Ghosting

Ghosting is the act of going through the motion of drawing a mark, but without actually touching the page. You bring your pen to the first point, then move the pen to the end point with a smooth, confident motion, holding the pen a little above the surface of the page. Then you lift your pen up again, bring it back to the start, and repeat the process.

This will help convey to your arm the "orders" you determined in the planning step, and will develop some short-term muscle memory. As you practice the use of this technique more and more (over days, weeks, months, etc.) you'll find what number of times you should repeat this motion. The focus is ultimately on getting "comfortable" and "familiar" - what these words really mean for you will come from experience.

What? I followed the plans. I did my job. Now it's lunch time.

Step 3: Execution

When one hits this last of the three stages, students are usually full of anxiety. We've gone through all the planning, the preparation, and now it's the time to actually go through the only step that *produces* a result. And it's that anxiety that causes us to mess up.

Instead, we once again have to go back to the production line mentality. The one executing the mark is not the one who planned, nor the one who prepared. They're a new version of ourselves who was given simple instructions, and only needs to worry about one thing:

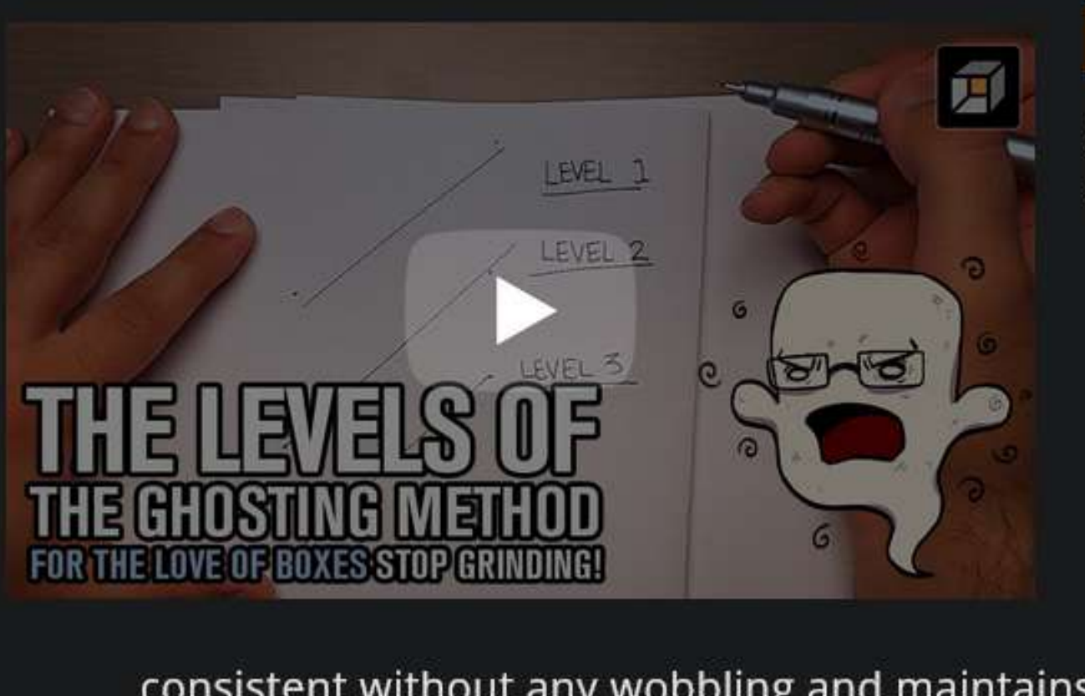
Executing the mark with confidence. No hesitation, no second-guessing, no attempting to avoid a mistake. If you make the mark confidently but mess up on accuracy, then *you* didn't mess up. It's one of the earlier people up the production line that messed up.

Your job is to make a single smooth stroke. The second your pen touches the page, you need to accept that any opportunity to avoid a mistake has passed, and all you can do is commit to the motion and push through.

That's all there is to it.

The purpose of this exercise

This exercise is intended to introduce you to a technique that you will be using on every single mark you make through all of the Drawabox lessons (and hopefully beyond). The goal is to, over time, develop a habit of thinking before you draw. To consider what purpose the mark you're about to make serves and whether or not it is the best mark for that purpose, or if another existing one is already accomplishing the same task. And of course, to ensure that you are as prepared as you need to be to make that mark, rather than rushing in half-cocked.


LEVEL 1
LEVEL 2
LEVEL 3
THE LEVELS OF THE GHOSTING METHOD
FOR THE LOVE OF BOXES STOP GRINDING!

The "Levels" of this exercise

Also worth thinking about is the fact that there are several levels of "success" with this exercise:

- **Level 1**: Line is smooth and consistent without any visible wobbling, but doesn't quite pass through A or B, due to not following the right trajectory. It's a straight shot, but misses the mark a bit.
- **Level 2**: Line is straight, smooth and consistent without any wobbling and maintains the correct trajectory. It does however either fall short or overshoot one or both points.
- **Level 3**: Line is straight, smooth, consistent without any wobbling. It also starts right at one point and ends exactly at the other.

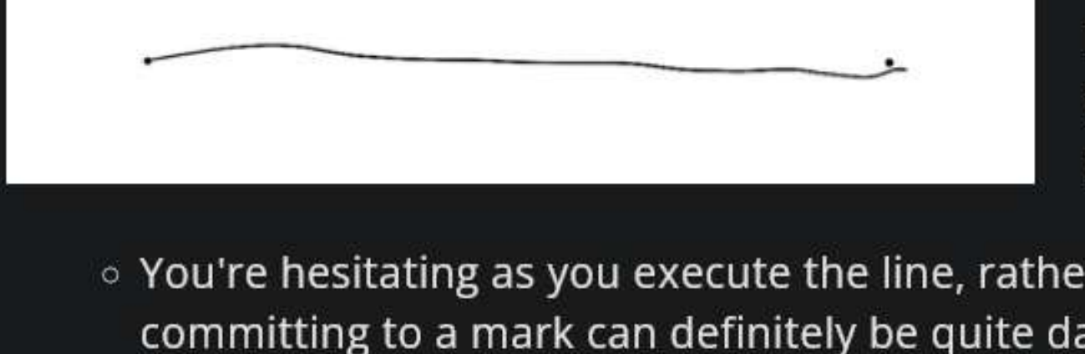
Take it one level at a time - don't worry too much about the goals for level 3 if you're not yet nailing level 1.

Overshooting? Try this

A lot of students struggle with overshooting their lines, and as a result they tend to hesitate more as they reach the end point, causing them to undershoot and waver slightly as they slow their pen to a stop.

Here's an alternative: **Try lifting your pen off the page the second you hit that end point**. Lifting it up is a much more reliable action you can perform far more responsively, and it avoids the hesitation you get from slowing down.

In general, overshooting isn't that big of a deal *right now*. You'll get better at it, and it's always better than hesitating. Still, this approach can solve two problems at once.

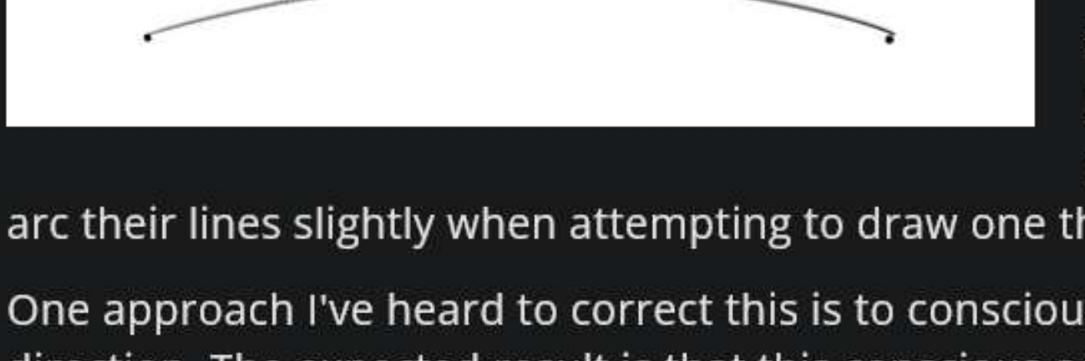


Mistake: Wobbly lines

If your lines wobble like this one, or show any kind of wavering, then there are two main possibilities as to what is happening:

- You're hesitating as you execute the line, rather than drawing with a confident motion. Finally committing to a mark can definitely be quite daunting, but it's integral that you get used to accepting that mistakes do happen. Things go wrong - you can prepare as much as possible (and you should) but the moment your pen touches the page, any opportunity to avoid a mistake has already passed. Now you must commit yourself, push through with confidence, and execute your line. It's also worth remembering: **we can still work with a line that is smooth and even, but there's not much that can be done with a wobbly one**.
- You're drawing with your wrist rather than your shoulder, and have to reposition yourself as you draw due to the limited range of motion. These lines should absolutely be drawn from the shoulder, because they rely heavily on achieving a smooth, consistent flow.

It could very well be both, so take a step back and analyze your approach before settling back in and trying again.



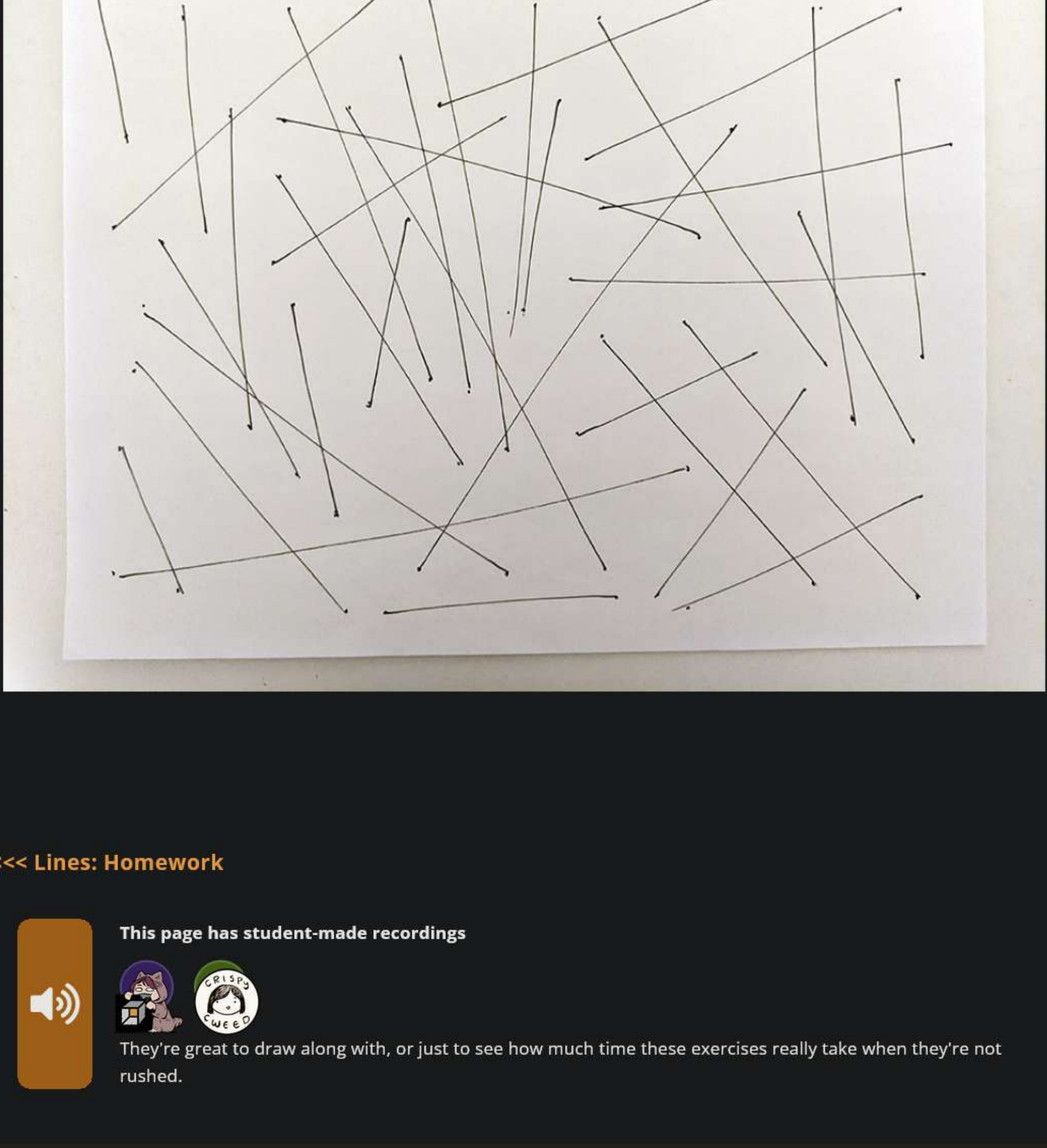
Mistake: Arcing lines

While this can be related to not drawing from the shoulder (and the smaller arc of motion forcing you into an arcing line), some people will find that they have a natural tendency to arc their lines slightly when attempting to draw one that is straight.

One approach I've heard to correct this is to consciously arc your line slightly in the opposite direction. The expected result is that this conscious adjustment will compensate for the issue and will result in a straight line that does not arc in either direction. Over time and practice, your brain will associate this motion with a straight line, and eventually you won't have to be quite so conscious of it.

Example homework

Basically you just need to fill a page with straight lines using the ghosting method. How you do this is up to you - as shown below, I've filled the page with points, and then drawn lines between them. Don't worry about letting them overlap or things getting cluttered - it's all perfectly fine, what's important is that you're putting the time into the ghosting method for each and every line you produce.



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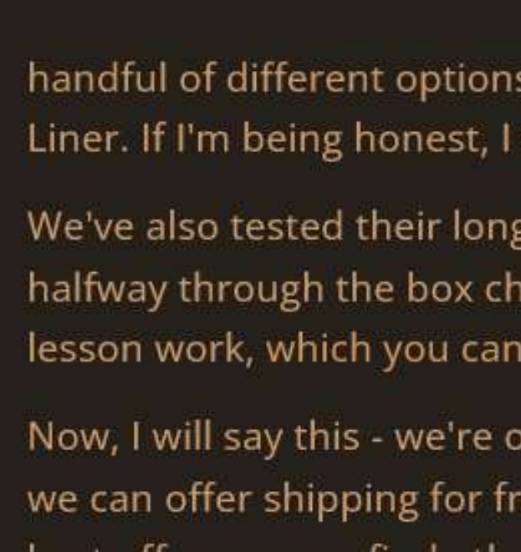

Drawabox-Tested Fineliners (Pack of 10, $17.50 USD)

Let's be real here for a second: fineliners can get pricey. It varies from brand to brand, store to store, and country to country, but good fineliners like the Staedtler Pigment Liner (my personal brand favourite) can cost an arm and a leg. I remember finding them being sold individually at a Michael's for $4-$5 **each**. That's highway robbery right there.

Now, we're not a big company ourselves or anything, but we have been in a position to periodically import large batches of pens that we've sourced ourselves - using the wholesale route to keep costs down, and then to split the savings between getting pens to you for cheaper, and setting some aside to one day produce our own.

These pens are each hand-tested (on a little card we include in the package) to avoid sending out any duds (another problem with pens sold in stores). We also checked out a handful of different options before settling on this supplier - mainly looking for pens that were as close to the Staedtler Pigment Liner. If I'm being honest, I think these might even perform a little better, at least for our use case in this course.

We've also tested their longevity. We've found that if we're reasonably gentle with them, we can get through all of Lesson 1, and halfway through the box challenge. We actually had ScyllaStew test them while recording realtime videos of her working through the lesson work, which you can check out here, along with a variety of reviews of other brands.

Now, I will say this - we're only really in a position to make this an attractive offer for those in the continental United States (where we can offer shipping for free). We *do* ship internationally, but between the shipping prices and shipping times, it's probably not the best offer you can find - though this may depend. We also straight up can't ship to the UK, thanks to some fairly new restrictions they've put into place relating to their Brexit transition. I know that's a bummer - I'm Canadian myself - but hopefully one day we can expand things more meaningfully to the rest of the world.

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Lesson 1: Lines, Ellipses and Boxes

Ghosted Planes

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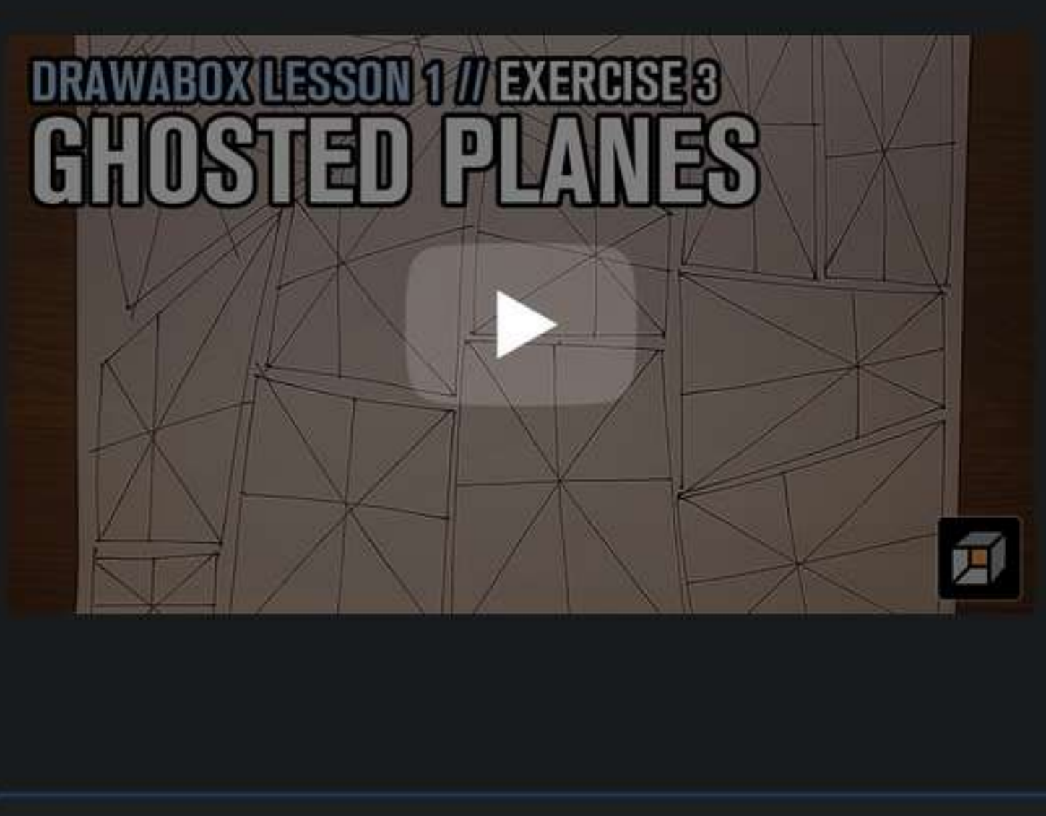


Ghosted Planes

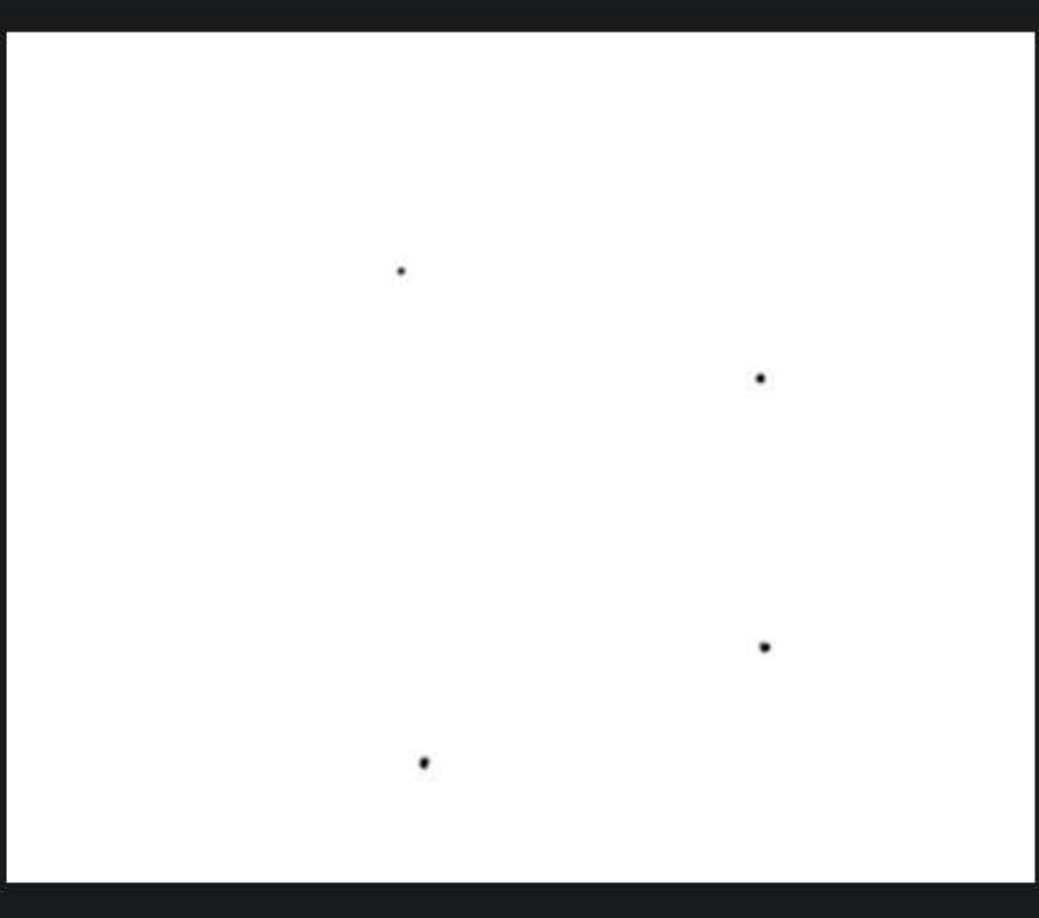
This exercise is an extension of the previous one.

You'll find that we often build on previous concepts in this manner, first presenting an idea, getting some experience with it and then twisting it to make it just a little more challenging and giving you a little more to think about.

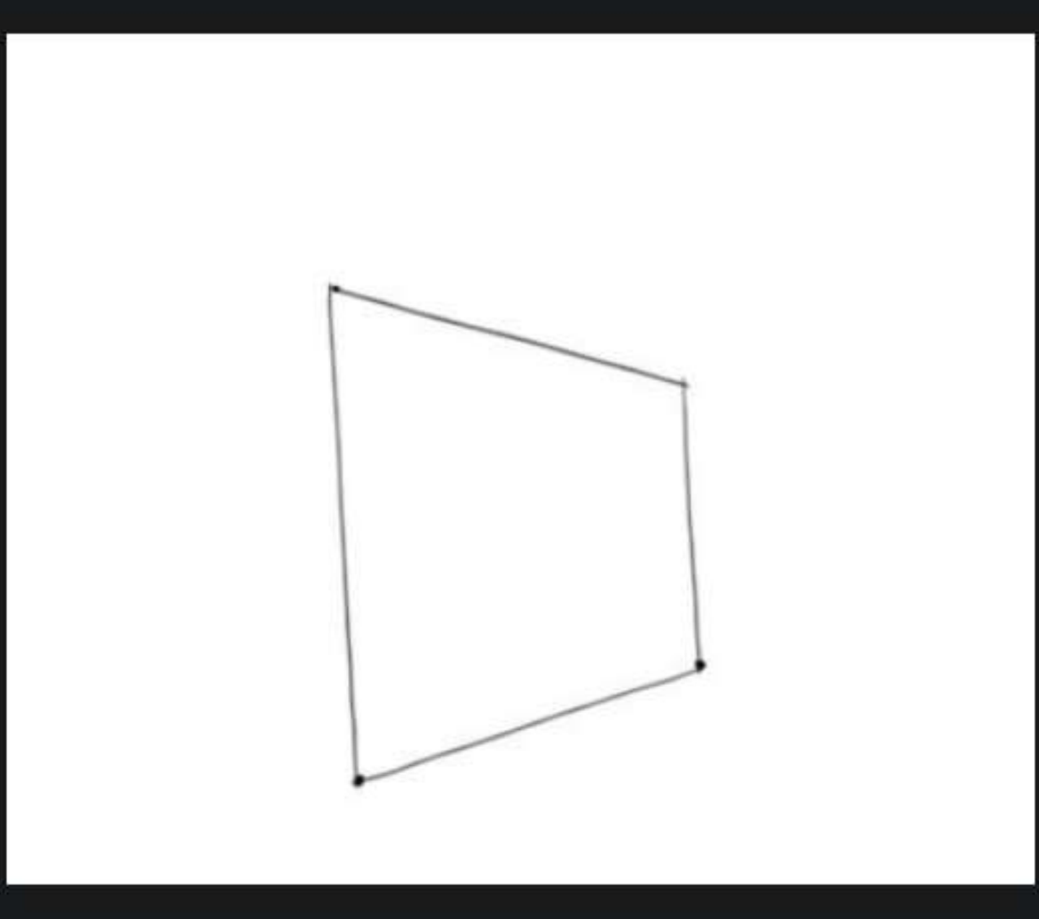
About your warmups

You'll quickly find that this exercise is basically just a more purposefully organized version of the ghosted lines exercise. As such, you can feel free to do this exercise *instead* of the ghosted lines when picking exercises to do for your warmups at the beginning of a given sitting.

When we get into the next section (where we talk about ellipses), you'll learn about the Ellipses in Planes exercise, which adds yet another level to the exercise and making it an even better combo for warmups.

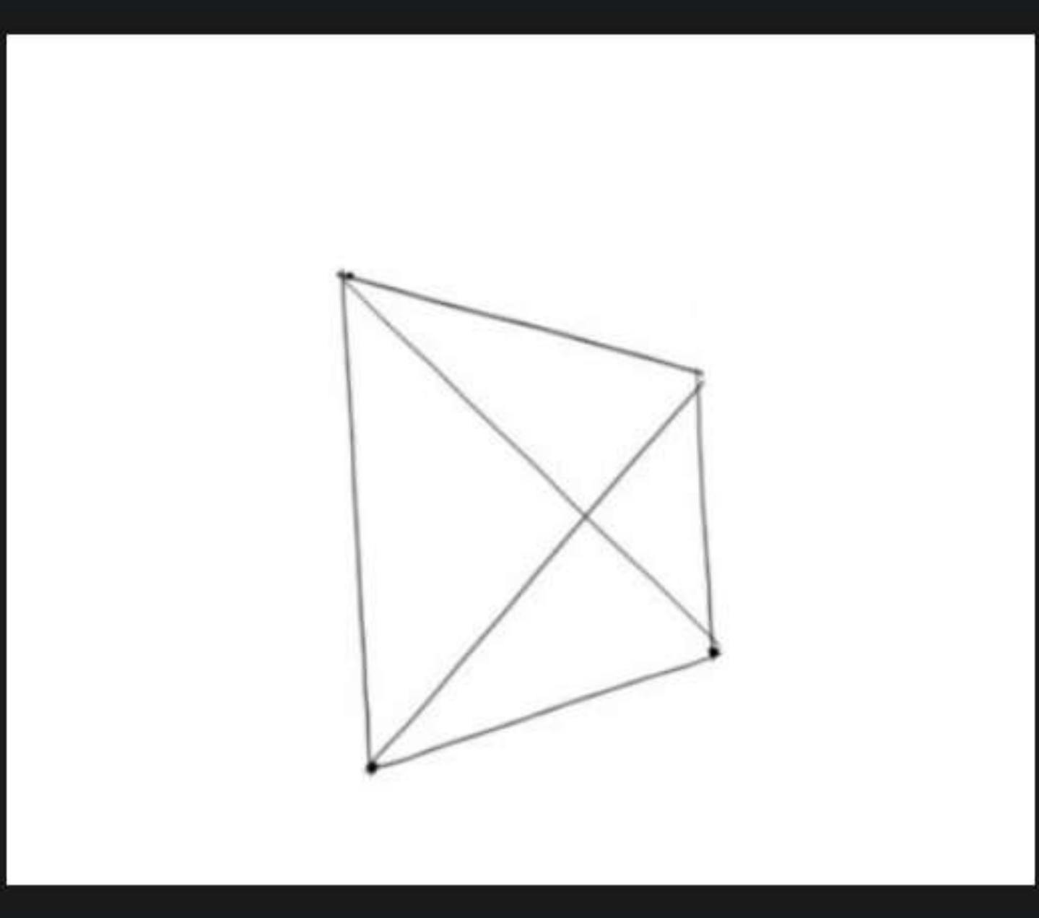


Just like with the ghosting exercise, we start out by planning out our marks. Here we're doing so for more than one line at a time - we want to produce some sort of quadrilateral. Don't worry about making all the edges the same length or anything like that, just place the four points on the page wherever it feels right.

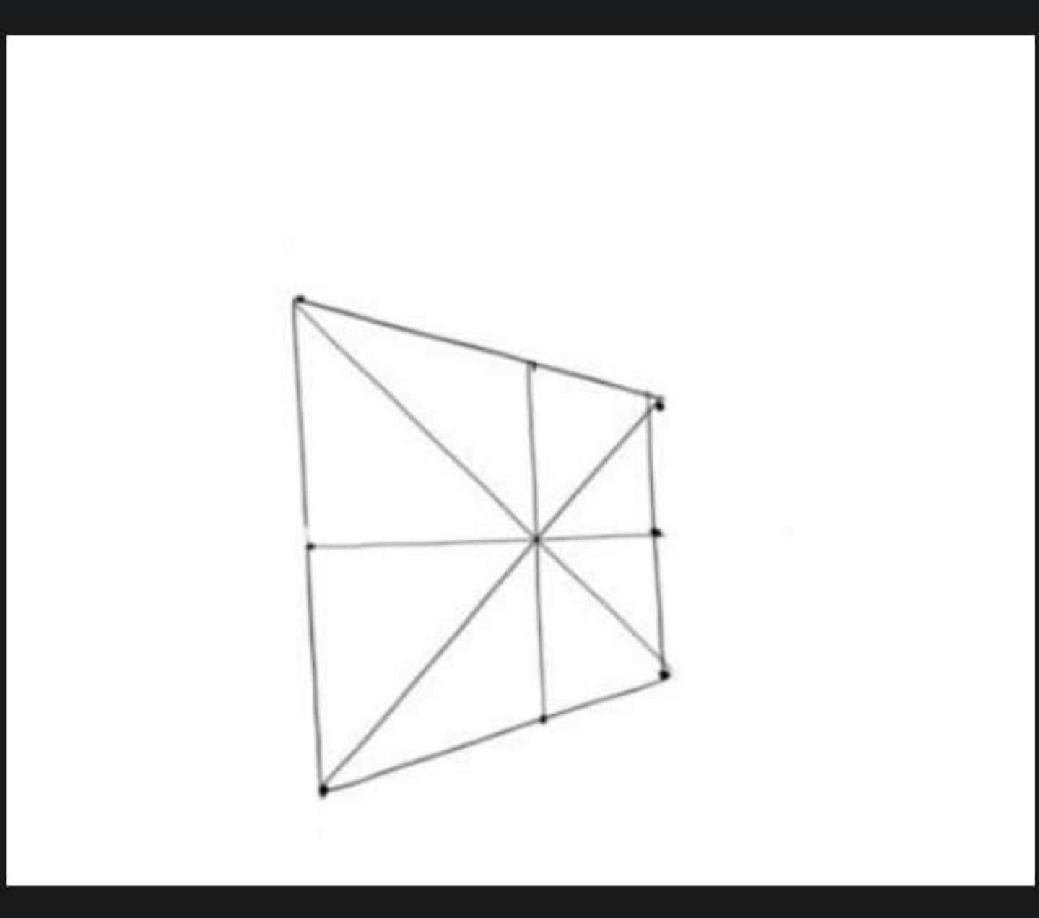


For each pair of points, rotate your page to find a comfortable angle of approach, ghost through the motion as much as is needed to feel comfortable, and then execute the stroke with a confident, persistent pace. No hesitation, no thinking about the plane as a whole, focus only on the mark you're making at that moment.

Some students get too caught up in the big picture of what they're doing, and they lose track of the individual actions. All that matters is what you're doing now, as you make this single mark.



To add some more practice with ghosting, go ahead and construct lines between the corners of our plane.



Finally, lets bisect the plane in both dimensions, drawing a cross through the center of the X we created in the previous step.

Remember to use the ghosting method for *every* mark you draw - in this case, that means starting with adding your start and end point. Ghosting is going to be a technique you're going to use a lot throughout this course.

Now, for those of you who've tackled perspective before, you may start fussing over things like, "how do I know my cross is centered along each edge of the plane" and other concerns. For now, this exercise has nothing to do with perspective. It's just a bunch of lines on a flat page, nothing else to worry about.

For any 'common mistakes' you can look at those listed on the ghosted lines page.

Keep your pages for this exercise!

We're going to use these pages when we get into the Ellipses in Planes exercise in the next section. Don't throw them away! Otherwise you'll have to draw a whole new set.

The purpose of this exercise

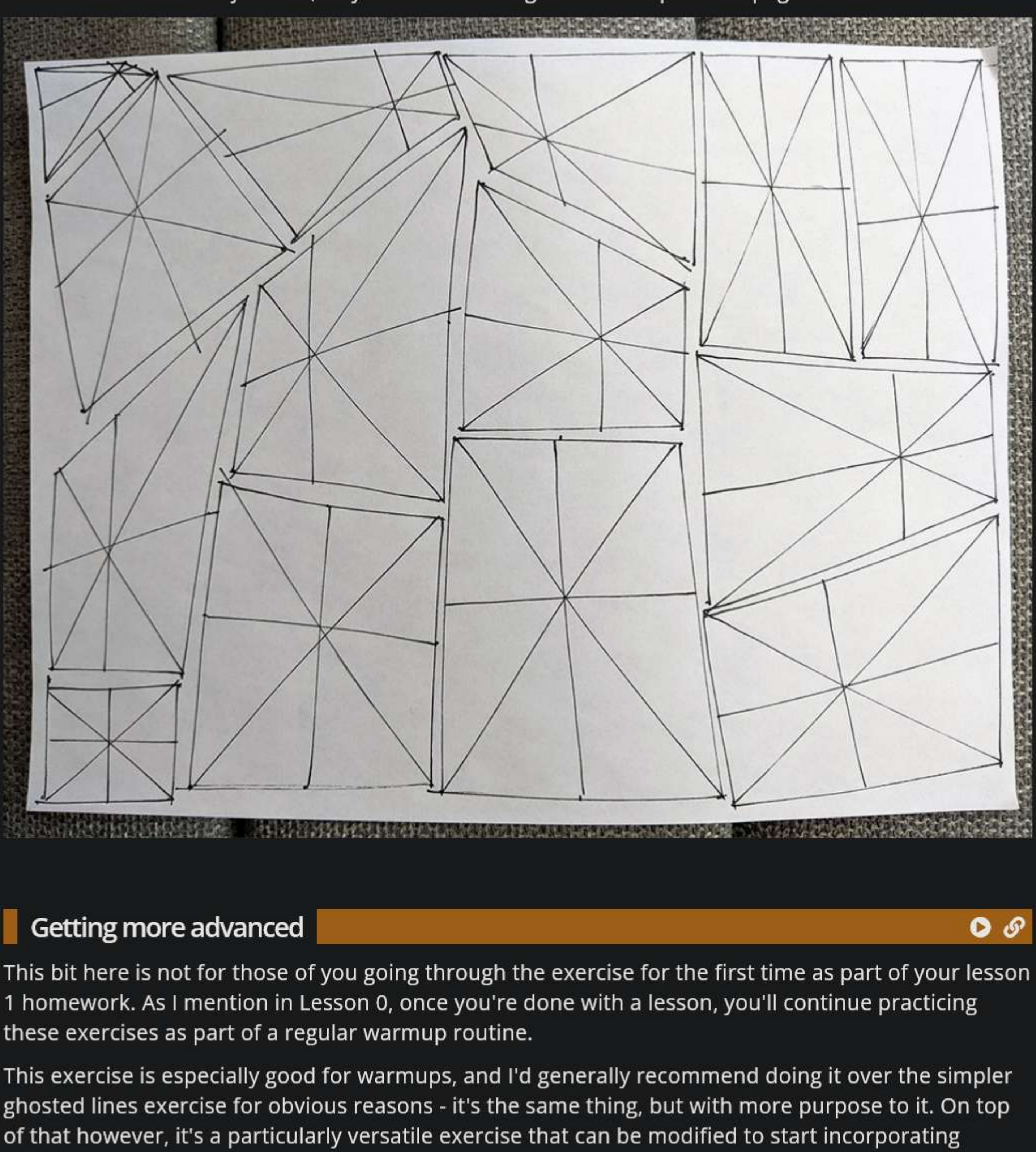
This exercise is about applying the ghosting method to something (slightly) more complex than a single line. There will be a similar jump when you get to the boxes section, and have to worry about applying this technique to three dimensional forms. I frequently see students who are used to putting a certain amount of time in per "unit of work". In the lines section, one unit of work is one line. In the ellipses section, one unit of work is one ellipse. Finally, in the boxes section - I'm sure you see where I'm going with this - one unit of work is to them, one box.

But that's not correct - a box consists of several lines, so a box should be equal to as many units of work. This planes exercise has you tackle something that consists of many lines, while also putting the time and focus in for each individual stroke in order to ensure that it is done as well as you can manage.

It also takes certain aspects of the ghosting method and spreads them out - for example in my demonstration above, we lay out all four points for the plane before even drawing our first line, fleshing out our requirements early. Similar approaches can be used when drawing things like boxes, or other more complex forms.

Example homework

Here's an example of how you might lay out your page. Try to include a variety of sizes of planes, and interlock them similarly to this, so you take advantage of all the space the page has to offer.



Getting more advanced

This bit here is not for those of you going through the exercise for the first time as part of your lesson 1 homework. As I mention in Lesson 0, once you're done with a lesson, you'll continue practicing these exercises as part of a regular warmup routine.

This exercise is especially good for warmups, and I'd generally recommend doing it over the simpler ghosted lines exercise for obvious reasons - it's the same thing, but with more purpose to it. On top of that however, it's a particularly versatile exercise that can be modified to start incorporating perspective concepts as well.

While at its most basic form, I don't want you worrying at all about perspective, as you move forwards through the lessons, you can start to envision these planes as being three dimensional rectilinear surfaces - that is, each plane represents a rectangle or a square floating in space. The third and fourth steps, where we construct the diagonals and the cross can be treated as being a subdivision of the plane (the X to find the center of the plane in three dimensions and the cross to bisect it). The cross will of course require some estimation to find the center of each edge in space, but it's a great thing to practice as you move through the rest of the Drawabox lessons.

<<< Lines: Homework

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

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What Next?

Lesson 1: Lines, Ellipses and Boxes

Ellipses

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What is an ellipse?

Ellipses are extremely important and notoriously annoying to draw. You'll find them all over the place in mechanical drawings. Cars, space ships, tanks, machines - anything man made will probably make extensive use of ellipses.

They also tend to feature prominently in organic drawings, especially as we look at the cross-sections of sausage-like forms.

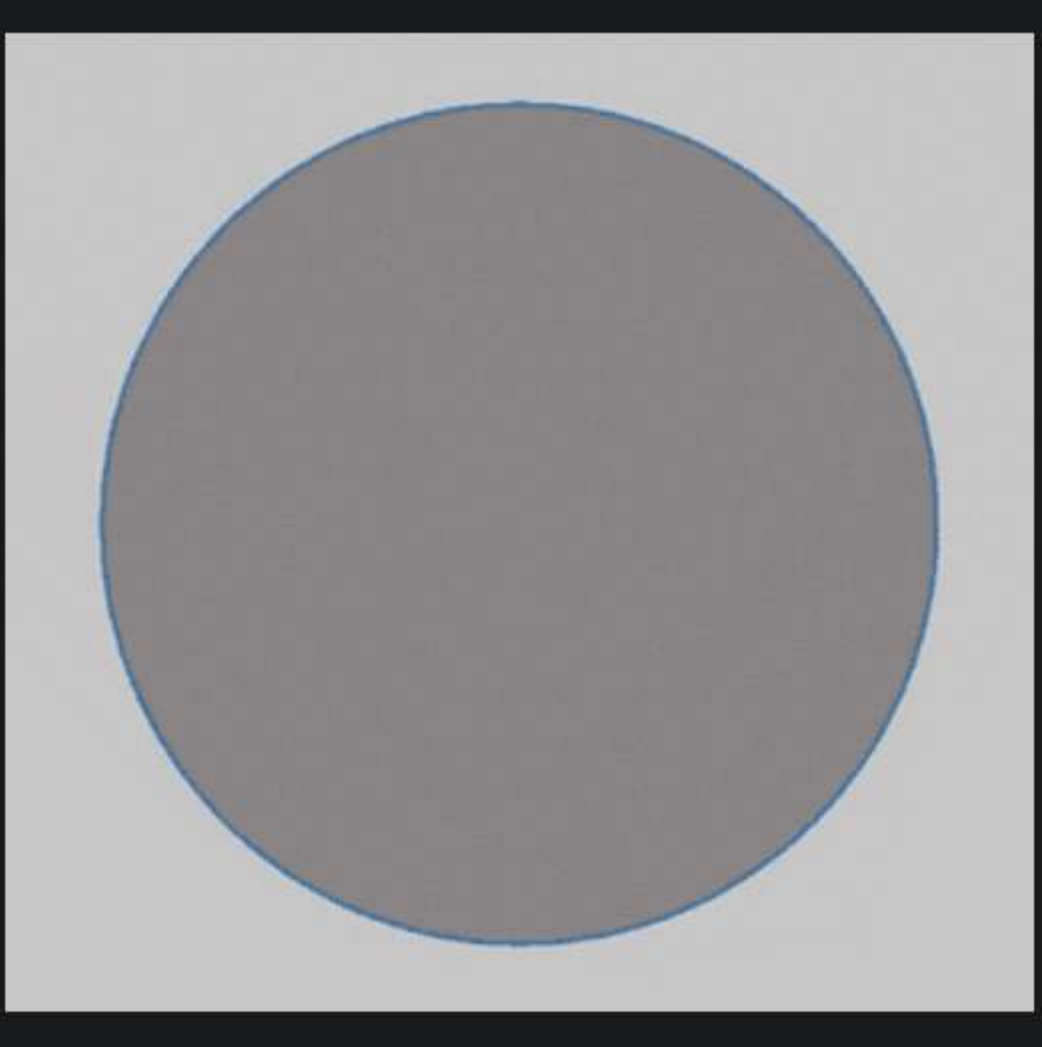
Let's take some time to explore what they are, how they behave, and how they can be used.

2D vs 3D

So before we get into the complicated stuff, remember: **drawing is** (at least within this course) **about taking things that are three dimensional** (like the world we live in) **and capturing it on a two dimensional surface**, be it a piece of paper, a canvas, or my friend's back who was stupid enough to have 16 year old me design a tattoo for him that is basically stuck on his body forever.

That means that drawing is really about figuring out how to represent 3D objects, and to understand how the lines and shapes we use to capture them change depending on how those 3D forms move around and rotate in space.

Throughout this course, I'm going to phrase things as this *in 3D space*, or that *in 2D space*. Pay attention to which I use in a given situation, because this stuff matters.

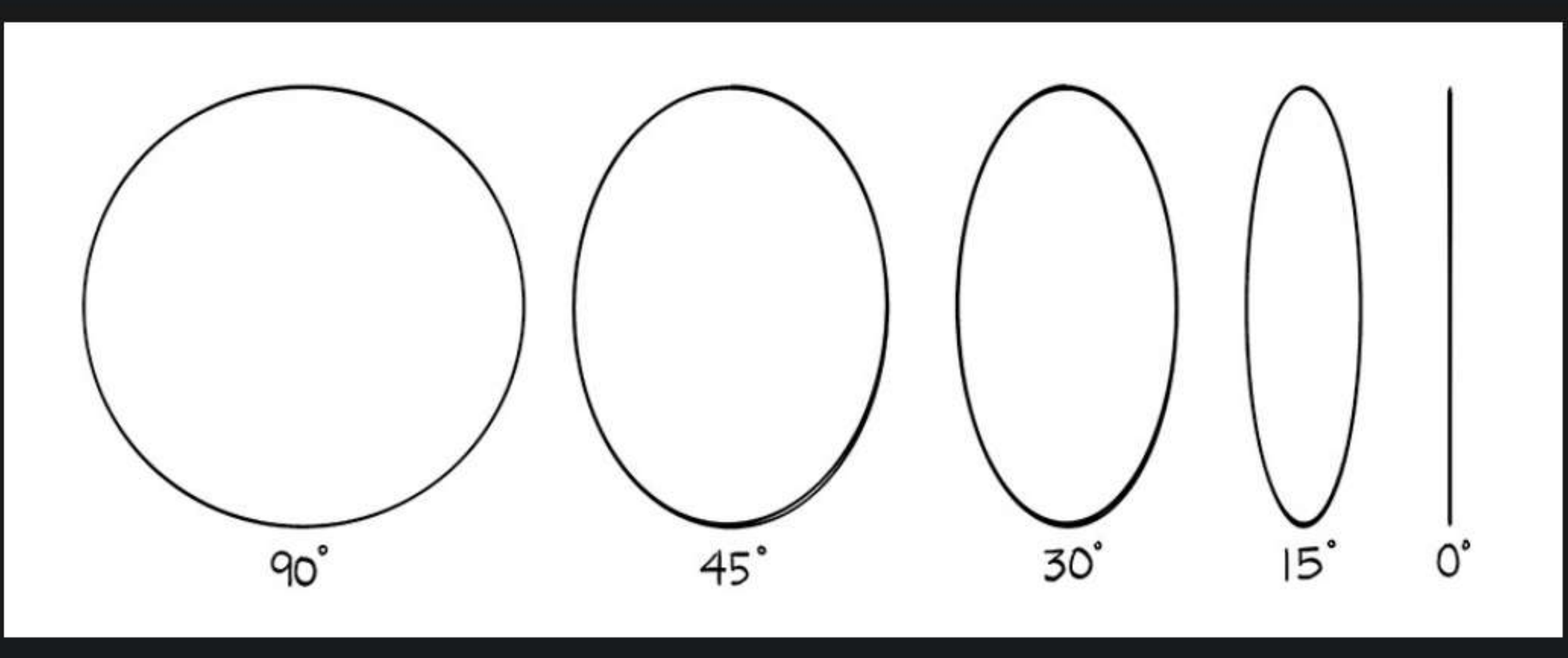


Circles in 3D space

For our purposes here in this course, we're going to be using ellipses in 2D space (drawn on the page) to represent circles that exist in 3D space.

Depending on whether you look at it as being two dimensional or three dimensional, this animated diagram depicts one of two things:

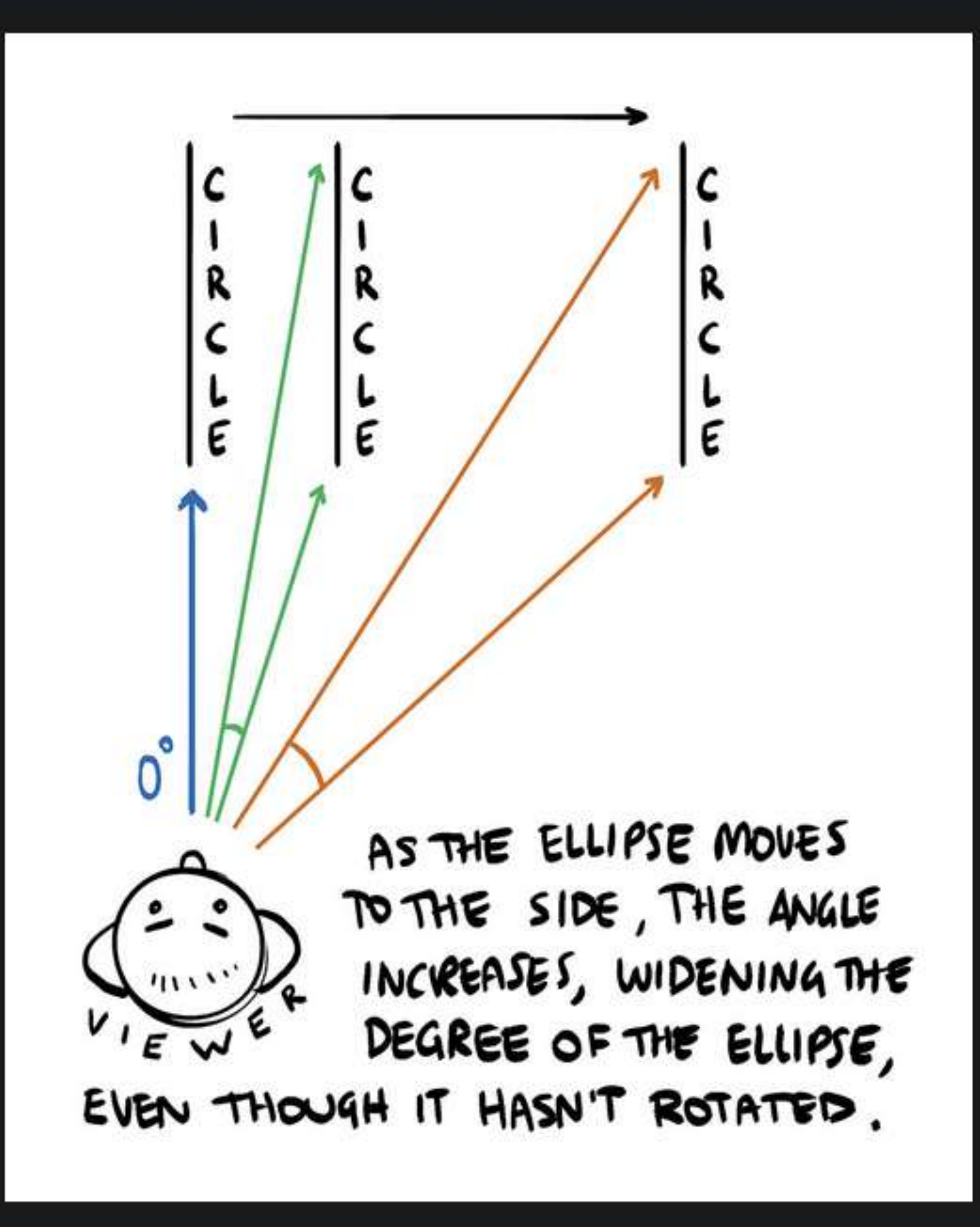
- In 2D space, it's a series of ellipses, from the widest to the narrowest.
- In 3D space, it's a circle being rotated, from facing towards the viewer, to facing away.



Degree

How our circle (in 3D space) is rotated relative to the viewer will determine just how wide our ellipse is going to be drawn. This width (always measured across the *narrowest* span that passes through the center of the ellipse) is referred to as the "degree" - because it is tied to the angle of rotation (in degrees) of the circle itself, relative to the viewer.

When the circle (in 3D space) is facing the viewer, it's going to be at its widest - 90 degrees. This is the same as drawing a circle on the page. As the 3D circle turns away from the viewer, the ellipse representing it will get narrower, until finally it reaches a degree of 0, when the ellipse is facing away.

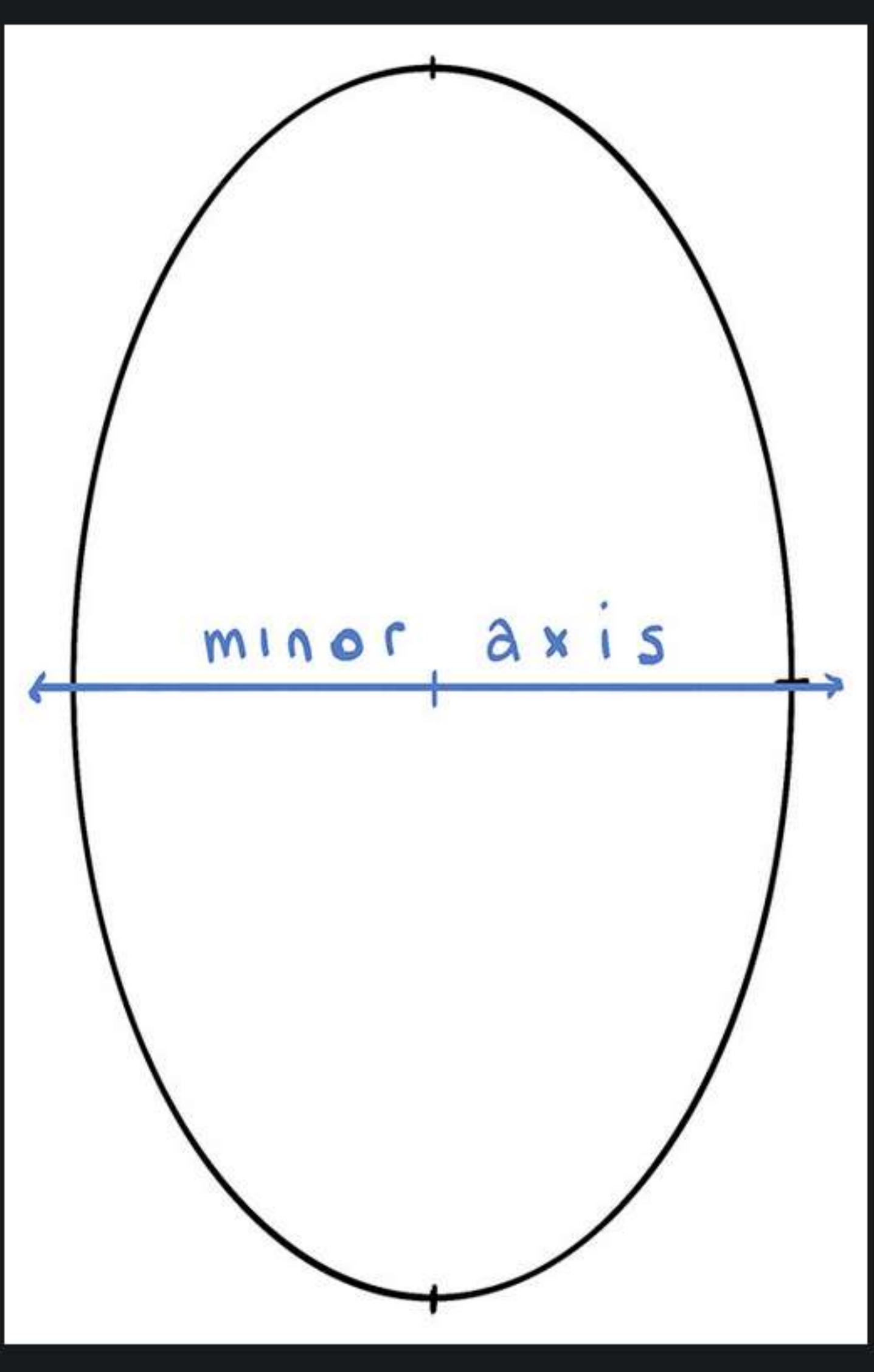

CIRCLE
CIRCLE
CIRCLE
0°
AS THE ELLIPSE MOVES TO THE SIDE, THE ANGLE INCREASES, WIDENING THE DEGREE OF THE ELLIPSE, EVEN THOUGH IT HASN'T ROTATED.
VIEWER

Degree shift

Keep in mind that since this is based on the angle between the direction the circle is facing *and* the direction the viewer is facing, the degree will actually change just by moving the circle around in space, without necessarily having to rotate it.

This diagram demonstrates how the further to the right a circle moves relative to the viewer, the more its face becomes visible, resulting in a wider ellipse representing it on the page, even without that circle rotating in space.

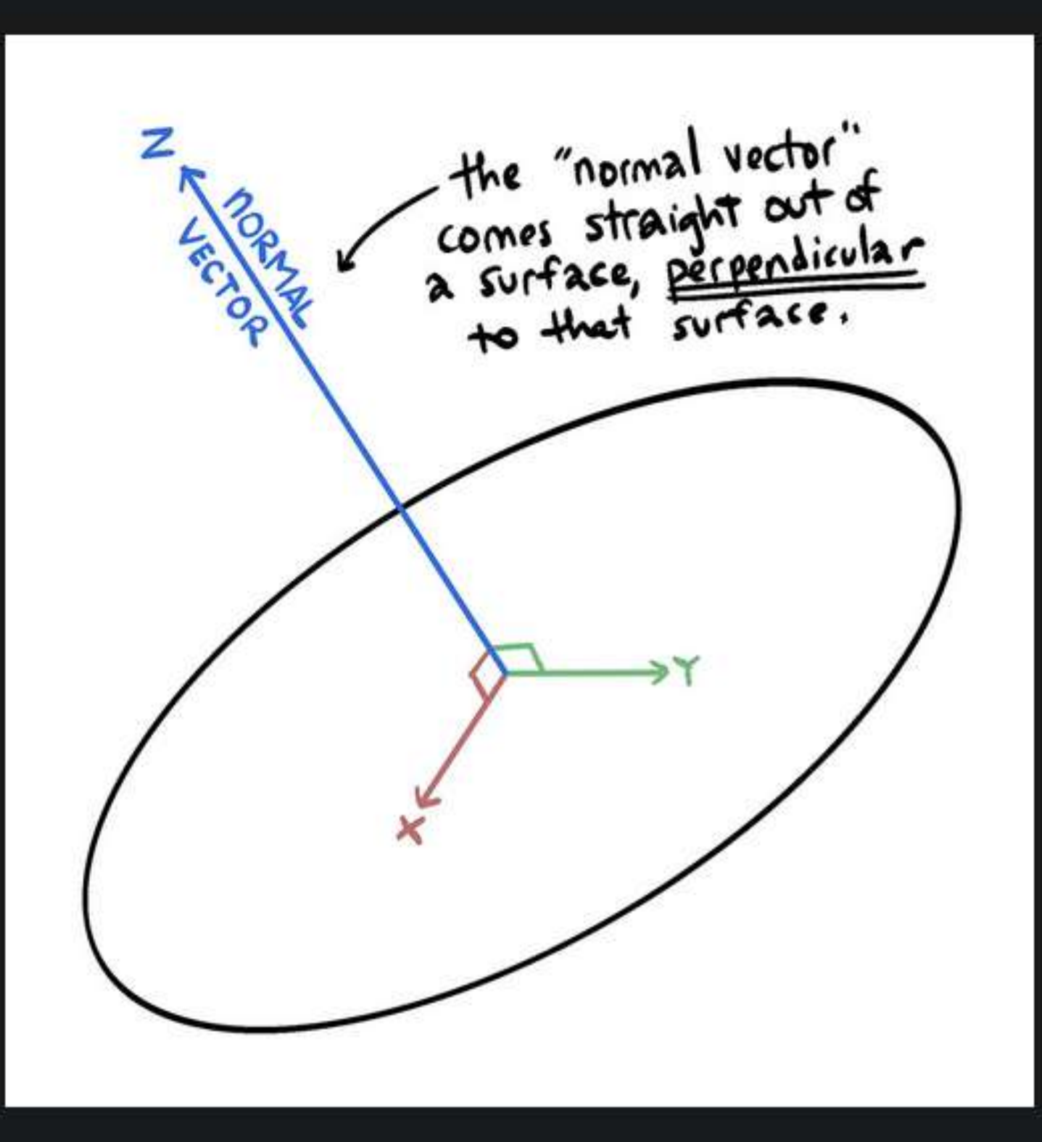
Throughout this course, we'll refer to this concept as the "degree shift" - basically the idea that the degree of our ellipse will shift wider or narrower, depending on how it moves in space.



Minor axis

We call the line that passes across the ellipse's narrowest span, and through its center, its **minor axis**. This minor axis line will cut the ellipse into two equal, symmetrical halves, so if it were to be cut out of the page and folded in half across this line, it would match up perfectly.

There's a *major axis* as well which runs perpendicular to it (across the widest span), but it's the minor axis that is actually the useful component.


Z
NORMAL VECTOR
the "normal vector" comes straight out of a surface, perpendicular to that surface.
Y
X

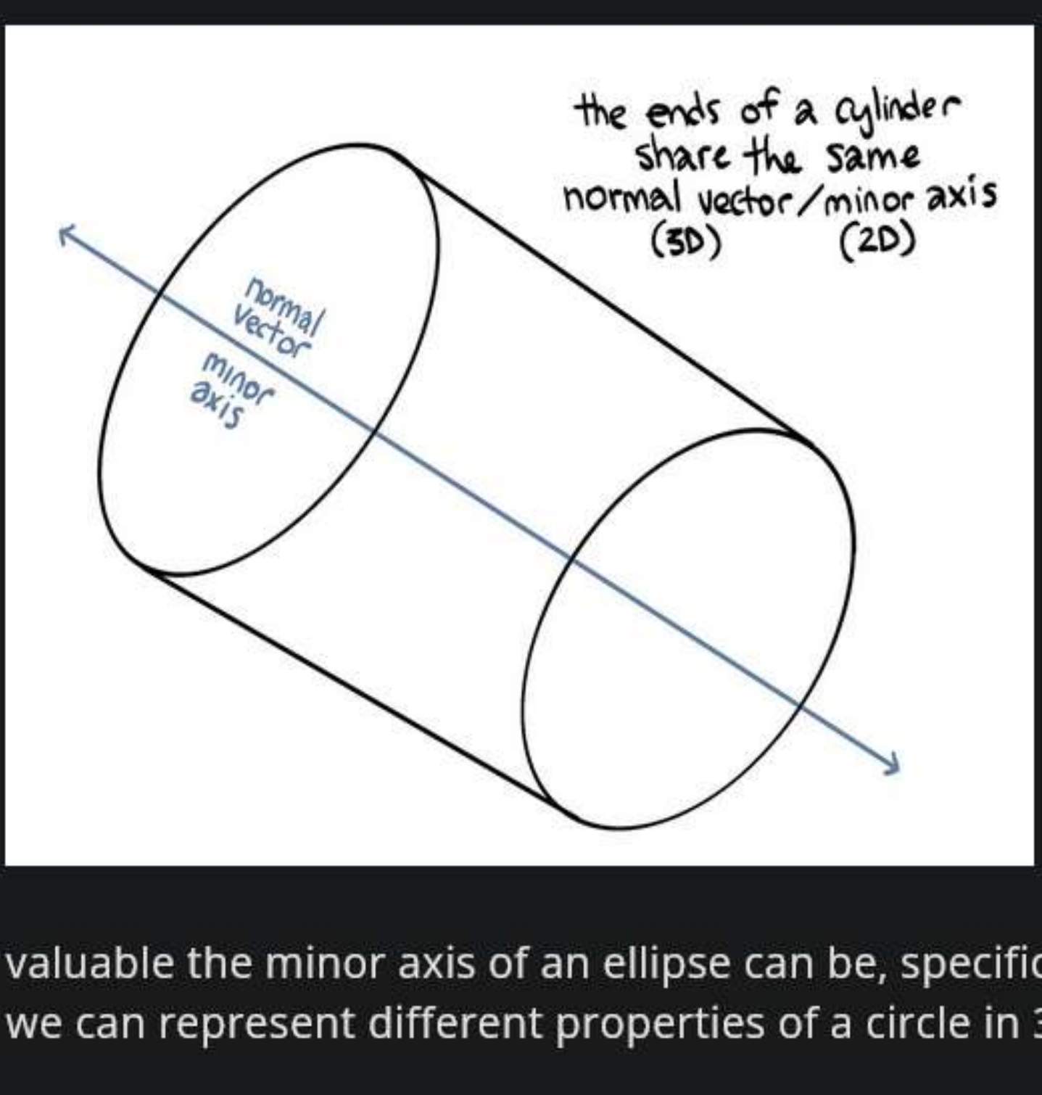
Normal vector

Just as the 2D ellipse represents a 3D circle, the minor axis is *extremely* useful to us because of how that minor axis line coincides with and aligns with the *normal vector* - the 3D line that shoots straight off the surface of the 3D circle, completely perpendicular to that surface.

This means that we've got two ways of establishing the orientation of our circle in 3D space, as we draw it on our 2D page:

- The degree (width) of the ellipse controlling the circle's rotation
- The minor axis of the ellipse controlling the orientation of the circle's normal vector - basically the direction that the circle is facing.

If we need our circle to be oriented in a specific way in a more complicated scene, we will actually be able to start out with a normal vector line, then use it as the minor axis for our ellipse, drawing the ellipse around it so the line splits it into two equal, symmetrical halves, down its narrowest span.


the ends of a cylinder share the same normal vector/minor axis
(3D)
(2D)
normal vector
minor axis

Cylinders

Taking it further, the minor axis/normal vector is also extremely useful when we get into cylindrical forms. Here it serves as the "spine" to our form.

The ends of the cylinder share the same normal vector (in 3D) and minor axis (in 2D) - but more than just the ends, if you sample *any* cross-sectional slice along the length of the cylinder, it'll also align to the same minor axis/normal vector.

Fortunately for you, we don't need to worry about this right now - they won't come into play until Lesson 2. It's just useful to see how valuable the minor axis of an ellipse can be, specifically as we try to figure out all the ways in which we can represent different properties of a circle in 3D space.

Homework and exercises

The homework assignment for this section is as follows:

- 2 filled pages of the Tables of Ellipses exercise
- 2 filled pages of the Ellipses in Planes exercise
- 1 filled page of the Funnels exercise

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here. In a pinch, I will accept work done in ballpoint, but only if the situation is dire. This is an exception only for this lesson as students get started.

<<< Lines: Homework

Boxes: The Basics of Perspective and Projection >>>

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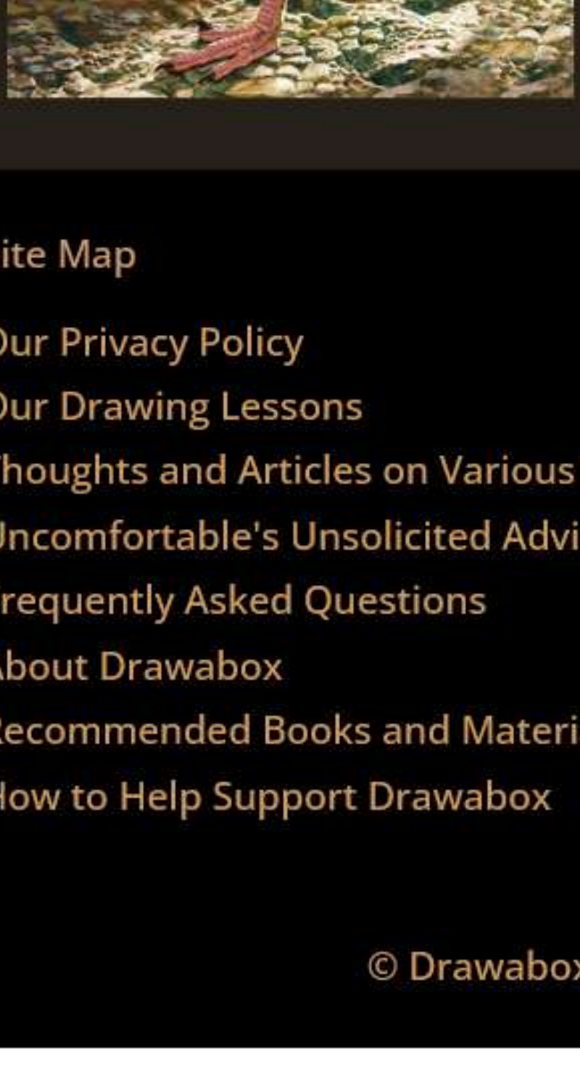

Color and Light by James Gurney

Some of you may remember James Gurney's breathtaking work in the Dinotopia series. This is easily my favourite book on the topic of colour and light, and comes highly recommended by any artist worth their salt. While it speaks from the perspective of a traditional painter, the information in this book is invaluable for work in any medium.

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What Next?

Lesson 1: Lines, Ellipses and Boxes

Tables of Ellipses

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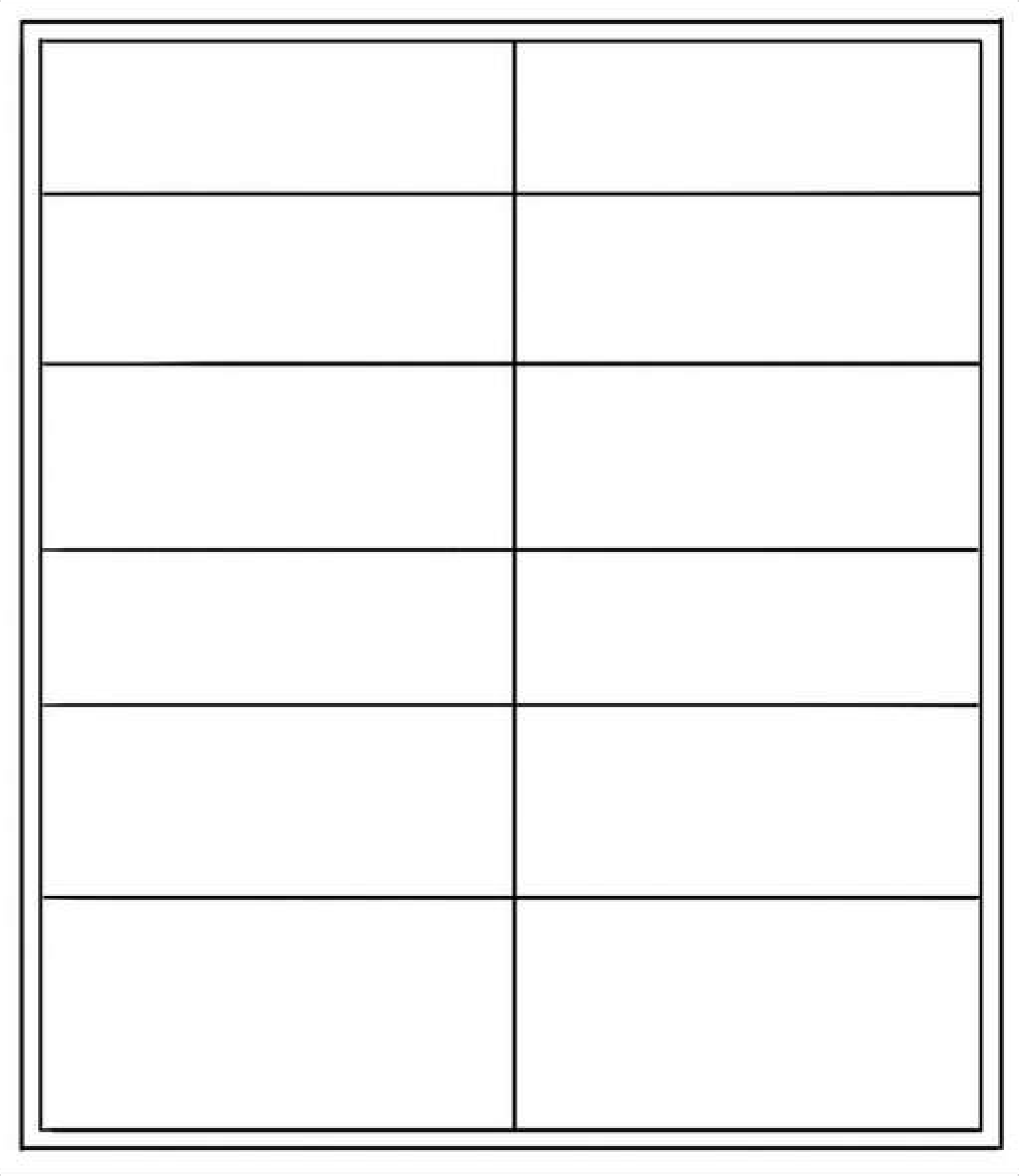
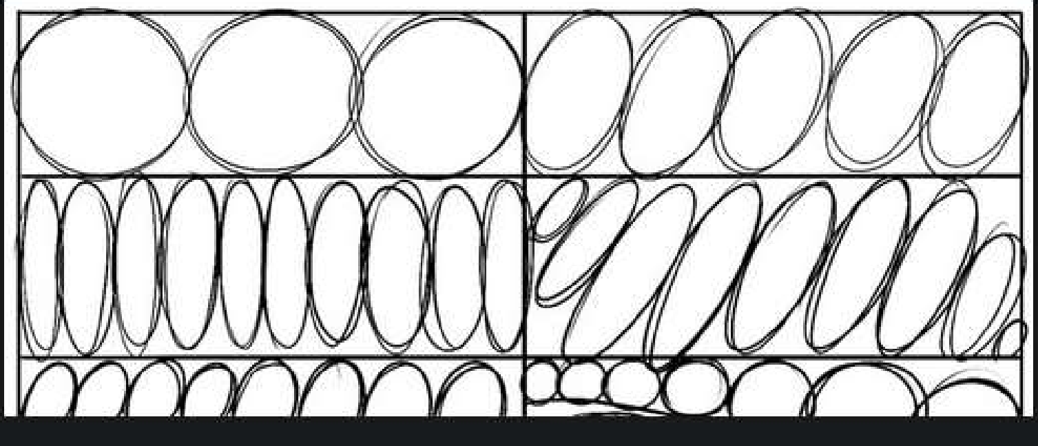
LISTEN WITH DRAWABOX

The first exercise is relatively straight forward, and involves drawing a lot of ellipses. These are not, however, simply free ellipses with no real goals. Instead, it is pinned on the idea of setting out criteria and targets for the ellipses we intend to draw, before drawing them. Therefore, when you draw your ellipse, it is either correct, or it isn't.



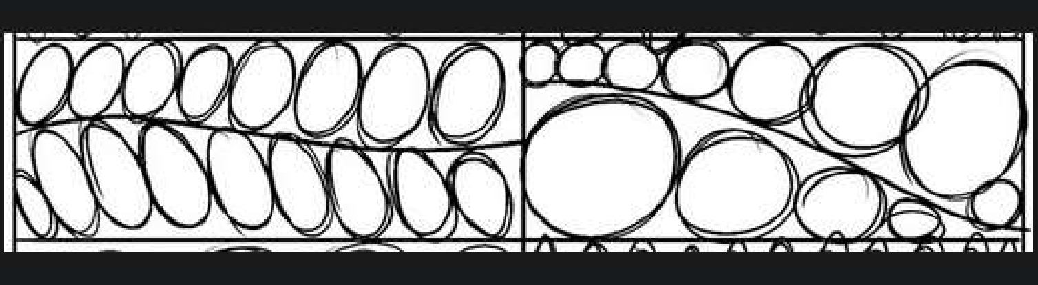
Start off by taking your piece of paper and dividing it into a table with two columns and a bunch of rows.

Each of these sections will contain a different variation on the exercise - here you can experiment with different approaches, but here's a few that you can try out first.



For this one, you draw a circle starting from the far left of the box. Then, draw another beside it. Keep repeating it until you fill in the whole box. Strive to make your circles touch the top and bottom of the box, as well as the line to the left of it.

Next, same idea, but with ellipses. Within the same section, you should aim to draw ellipses of the same degree. You can also play with the angle of the ellipse, and this should also be consistent within the same section.



This one's a little different. Draw a wave through the section, dividing it into irregular pockets of space. Then fill these spaces with circles or ellipses, trying to keep them touching the bounds of the section as well as the curve. Everything should fit in there snugly, and nothing should be floating around.

The purpose of this exercise

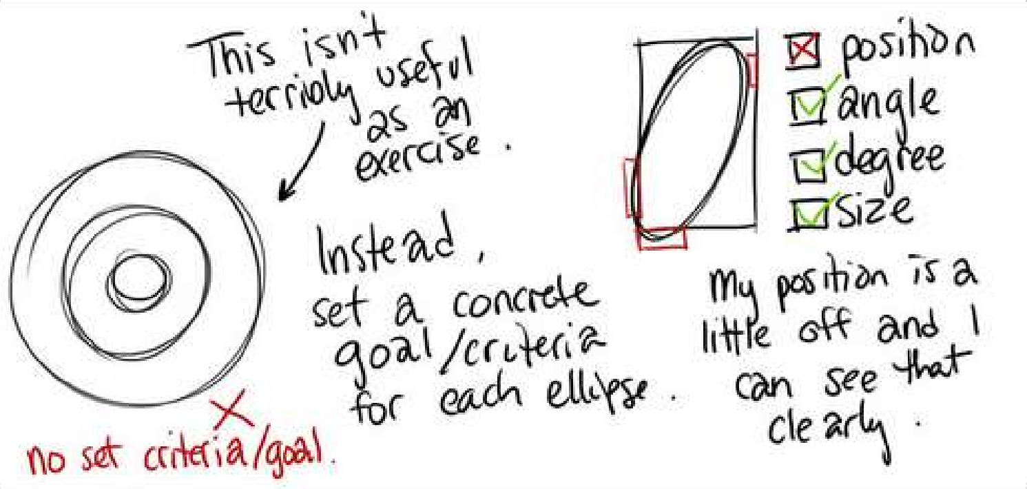
This exercise is meant to get you used to drawing ellipses, in a variety of sizes, orientations and degrees. It also sets out a clear space each ellipse is meant to occupy, giving us a means to assess whether or not an ellipse was successful, or if there were visible mistakes (where it went outside of its allotted space, or ended up falling short). Practicing against set criteria, with a way to judge success/failure is an important element of learning. There's nothing wrong with failure - it's an opportunity to learn. Having a clearly defined task allows us to analyze those failures and make the most of them.

Things to remember

When going through this exercise, there are a couple things I want you to keep in mind:

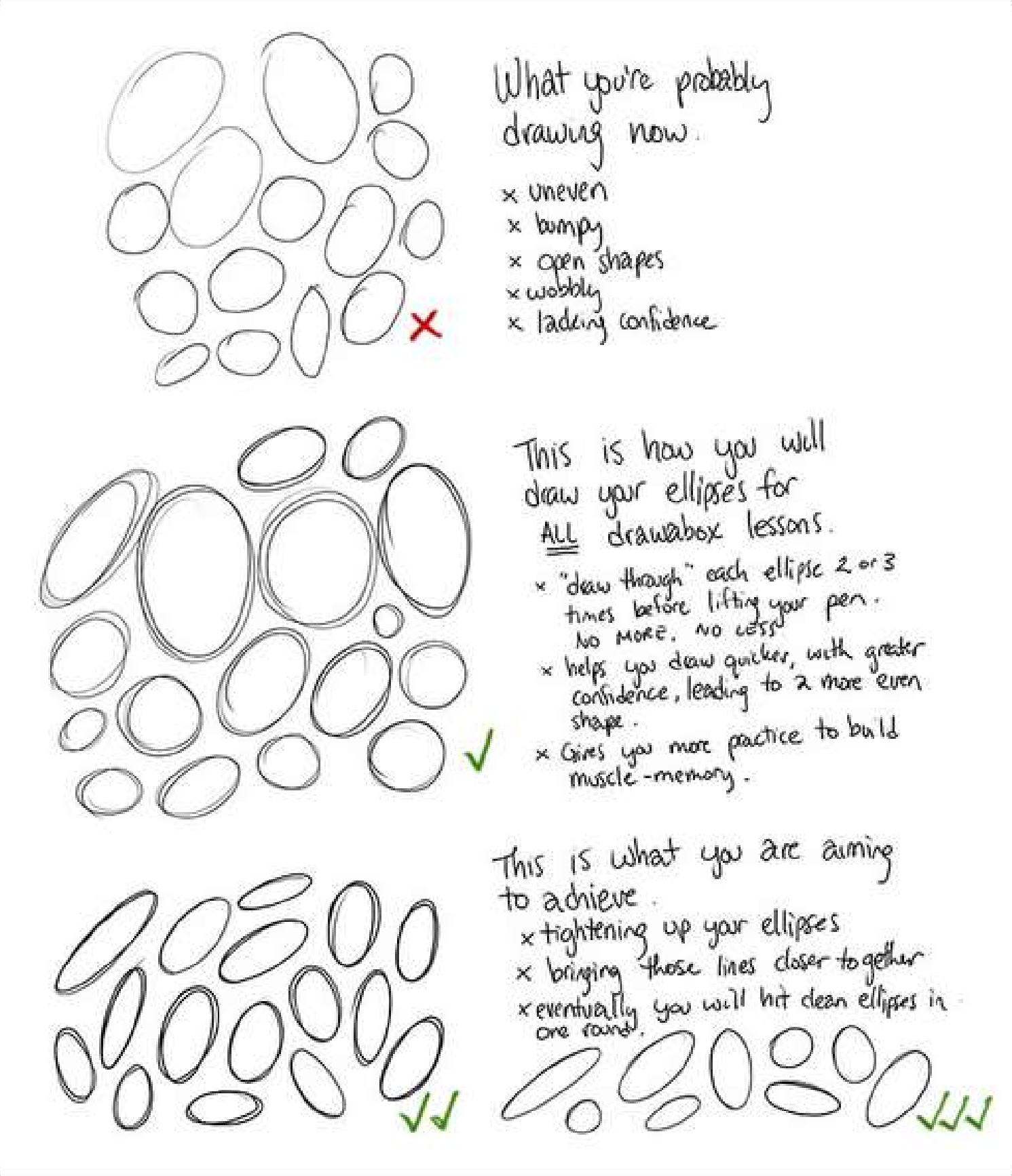
- Draw confidently - use the ghosting method and "draw through" your ellipses two full times before lifting your pen to achieve a smooth, even shape.
- Always set out a goal for the ellipse you're about to draw. This is generally what the "planning" phase of the ghosting method is for.

For a more in-depth explanation, you can check out this video, or the points listed below.


This isn't terribly useful as an exercise.
no set criteria/goal.
Instead, set a concrete goal/criteria for each ellipse.
☒ position
☑ angle
☑ degree
☑ size
My position is a little off and I can see that clearly.

Mistake: Drawing without a concrete goal

I've seen lots of people do these in the past - that is, drawing ellipses floating inside of other ellipses. This is my opinion of course, but I don't think they're terribly useful, since they don't give a concrete target to aim for. I understand that it definitely is tricky to draw a circle inside of another circle and keeping it centered, but I still don't feel like it's as effective as other more concrete exercises.


What you're probably drawing now.
× uneven
× bumpy
× open shapes
× wobbly
× lacking confidence
This is how you will draw your ellipses for ALL drawabox lessons.
× "draw through" each ellipse 2 or 3 times before lifting your pen. No more, no less.
× helps you draw quicker, with greater confidence, leading to a more even shape.
× Gives you more practice to build muscle-memory.
This is what you are aiming to achieve.
× tightening up your ellipses
× bringing those lines closer together
× eventually you will hit clean ellipses in one round.

Mistake: Not drawing through ellipses

This is something I'm pretty adamant about - you should be drawing through every single ellipse you draw for my lessons. That is, draw around the ellipse two or three times before lifting your pen. Two is ideal in my opinion, but three is also acceptable.

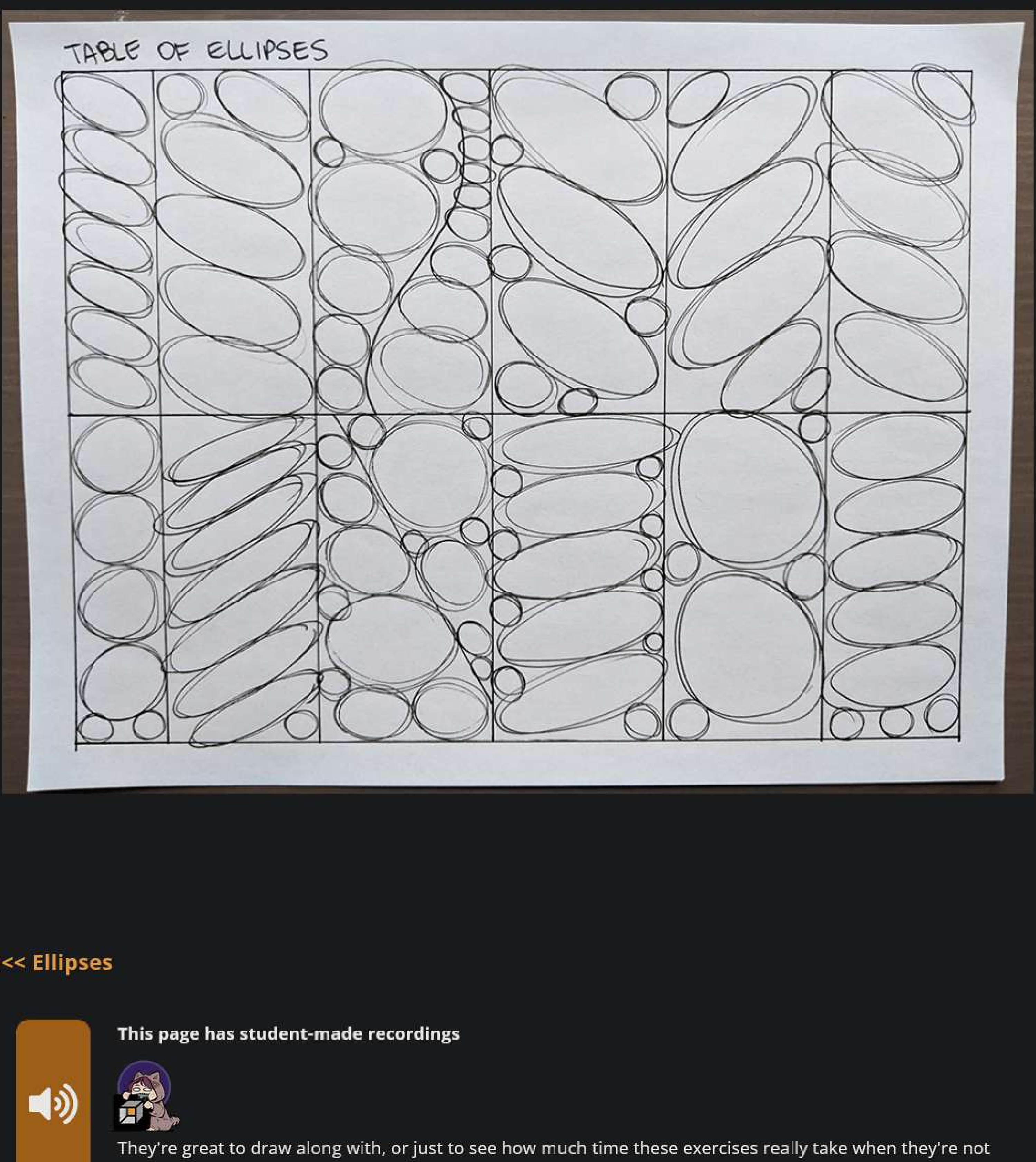
When you try to hit your ellipse in a single round, it's usually going to come out uneven and wobbly (due to drawing too slowly and carefully) or extremely loose (due to simply not having built up the muscle memory to nail an ellipse). Drawing through your ellipses gives your arm the chance to familiarize itself with what's being asked of it in that first pass, and then firm it up in the second.

Along with giving you an extra chance to build up the muscle memory, it also helps you maintain the confidence needed to achieve a smooth, even shape, without totally losing control.

As you get better, your ellipses will tighten up - the gaps between your successive passes will shrink and eventually your ellipses will appear much cleaner. At this point you'll probably be able to nail your ellipses in one pass, but I still want you to continue drawing through them for all of the Drawabox lessons. Outside of Drawabox, you're free to do what you like.

Example homework

Your end result will look something like this.



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Lesson 1: Lines, Ellipses and Boxes

Ellipses in Planes

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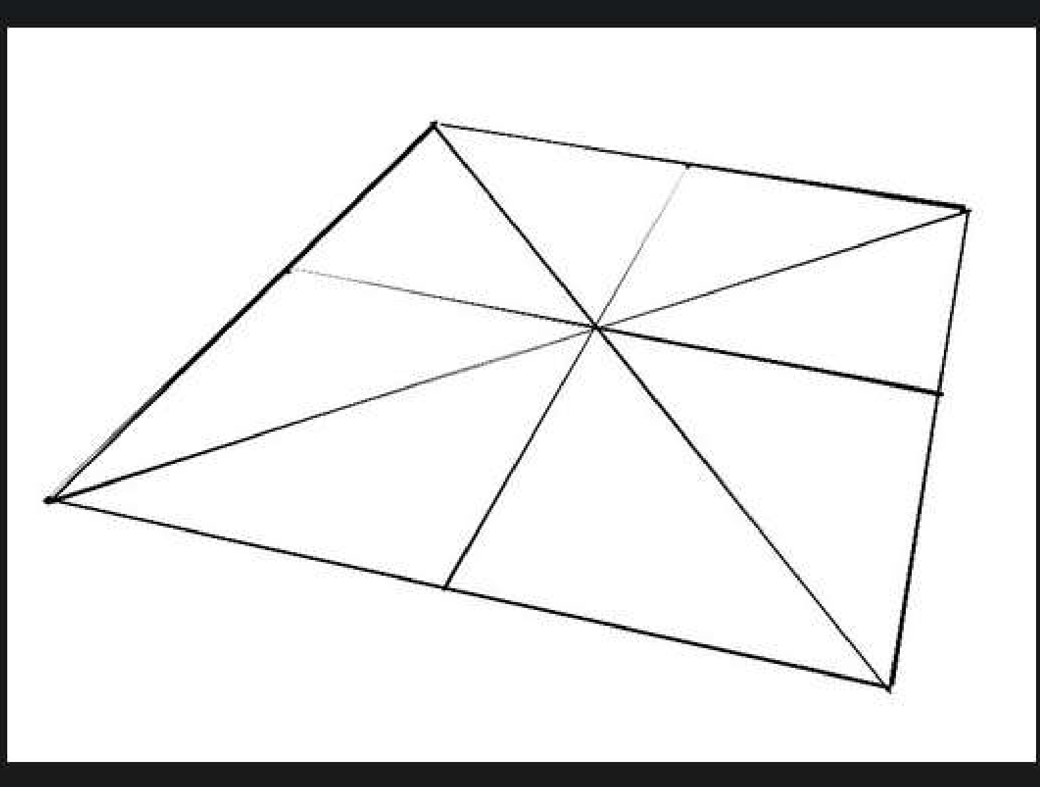
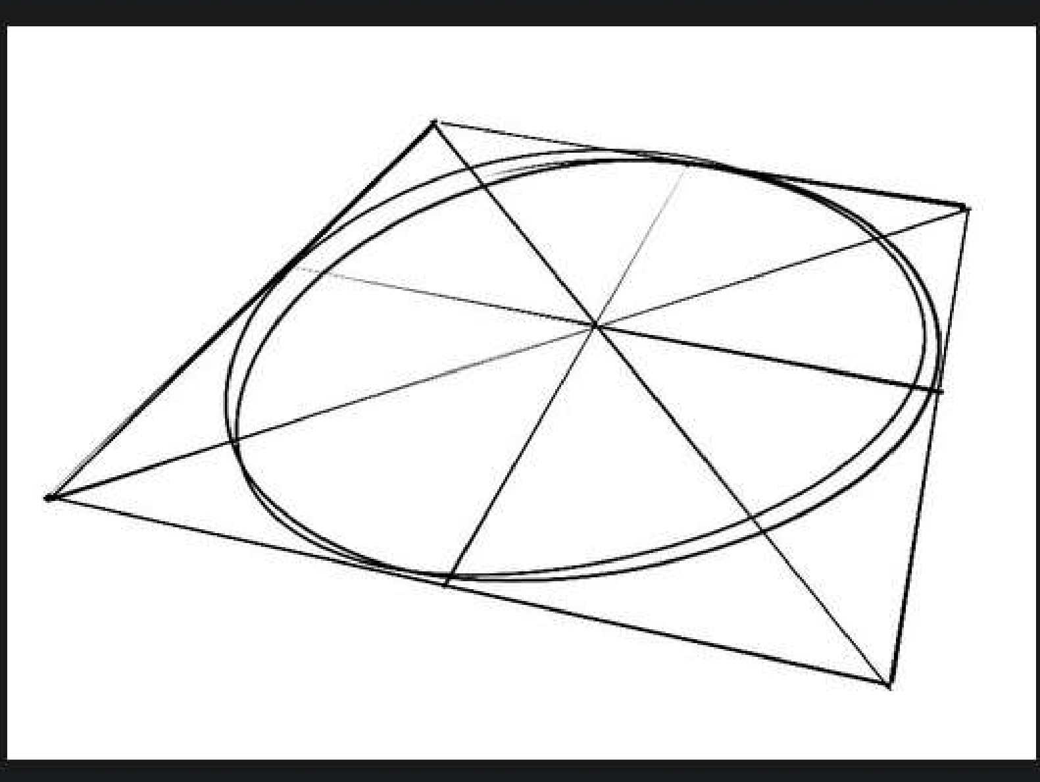
Just click "Listen with Drawabox"!

This one's really straight forward, though not as easy as it looks - remember those planes you drew as part of the lines section of this lesson? Find those pages (hopefully you didn't toss them out, burn them, or use them as nest materials for your pet bird), because we're gonna need 'em.



So, you've got your plane. Or as the case probably would be, a page full of them, but here we're going to focus on just the one. It's kind of an awkward shape to work with - this one's not too bad, but they can definitely get a bit crazy on account of being arbitrary quadrilaterals.



Put an ellipse in there. That's all.

It may look simple, but there are some pitfalls to watch out for. Don't worry about anything aside from getting the ellipse to be smooth and evenly shaped, and having it touch all four edges of the plane as snugly as you can manage. Of course, draw through your ellipses (as mentioned in the table of ellipses exercise).

Be sure to make use of the ghosting technique - this should of course be applied to every mark you put down, but it will especially help you here. Don't worry if you mess up - you'll have plenty of planes to practice with.

Purpose of this exercise

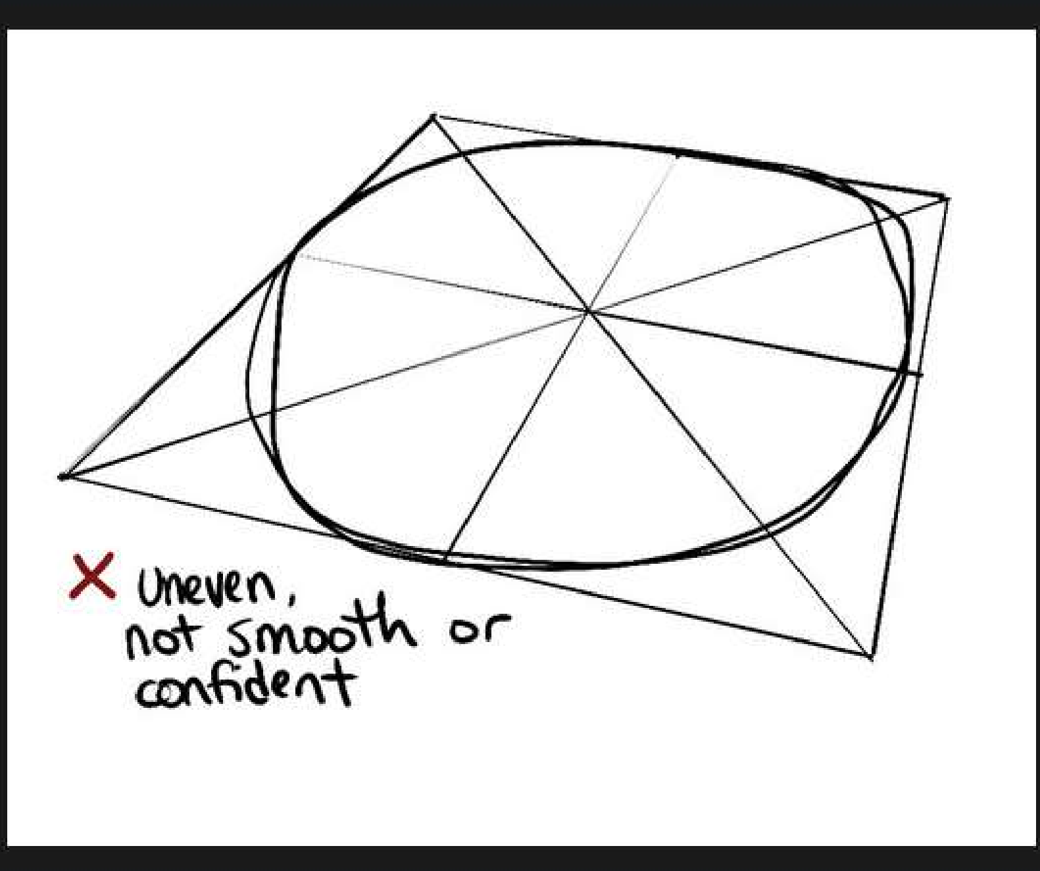
This exercise is just the beginning of something much more complicated. In the future, we'll be tackling constructing cylinders inside of boxes, and other similar challenges, and these will come with additional criteria that will need to be met. The purpose of this exercise however is just about maintaining the smooth, even shape above all else. That is your first priority. Second to that is, as mentioned above, fitting it snugly within the plane, touching all four edges. Given that these are generally awkward shapes to work in, I frequently have students who start deforming their ellipses, getting generally overwhelmed by the difficulty of the task.

More than anything, it's an exercise in calming down. The difficulties faced here are generally more of one's own making. Take it easy, and just try your best to drop a nice, even ellipse in there.

Things to remember

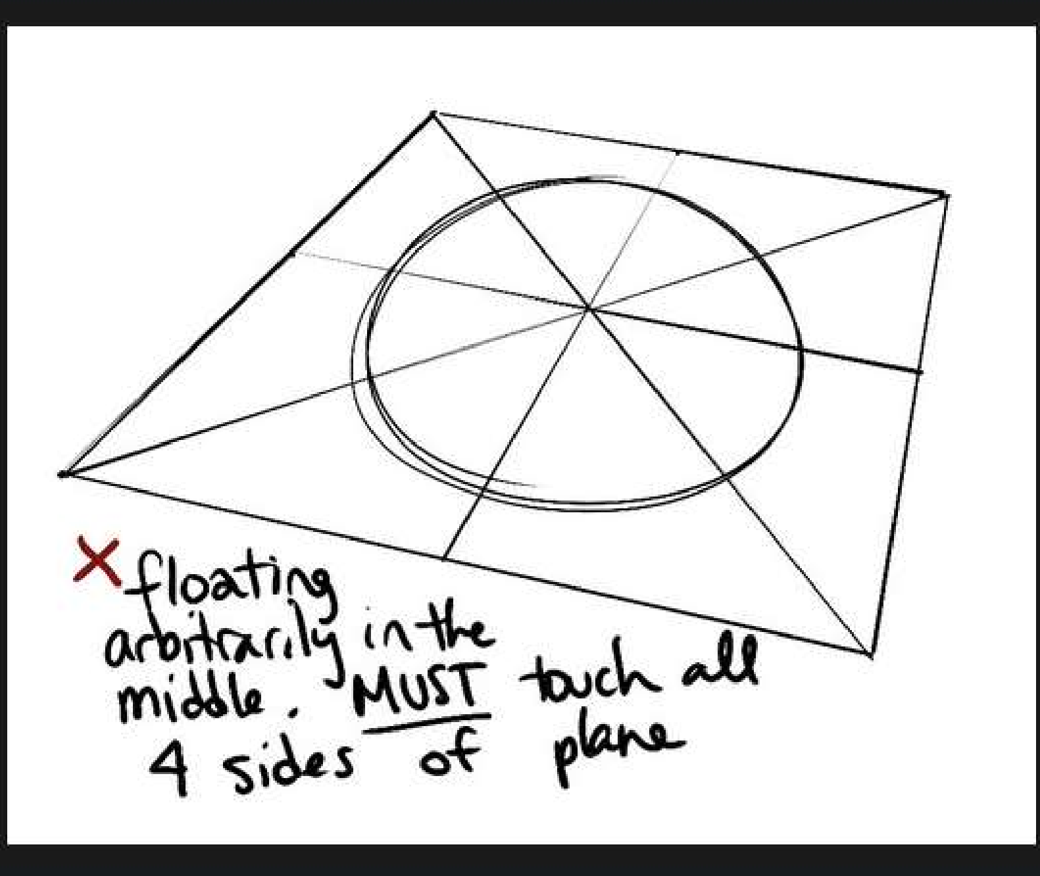
You're going to find that we're basically repeating the same things over and over - focus on a confident execution first, then address control/accuracy by using the ghosting method. It comes up so often because it really is at the heart of mark-making as a whole. So this isn't the first time we come across it, and it certainly won't be the last.

That said, let's take a look at how these concepts apply in particular to this exercise.



Mistake: Deformed ellipse

This is a mistake I see frequently. See how the ellipse is bumpy and wobbly, and it kind of reaches out to touch the edges rather than maintaining an evenness to its shape? Avoid this. As mentioned several times above, maintaining a smooth elliptical shape is critical and above all else is your first priority.

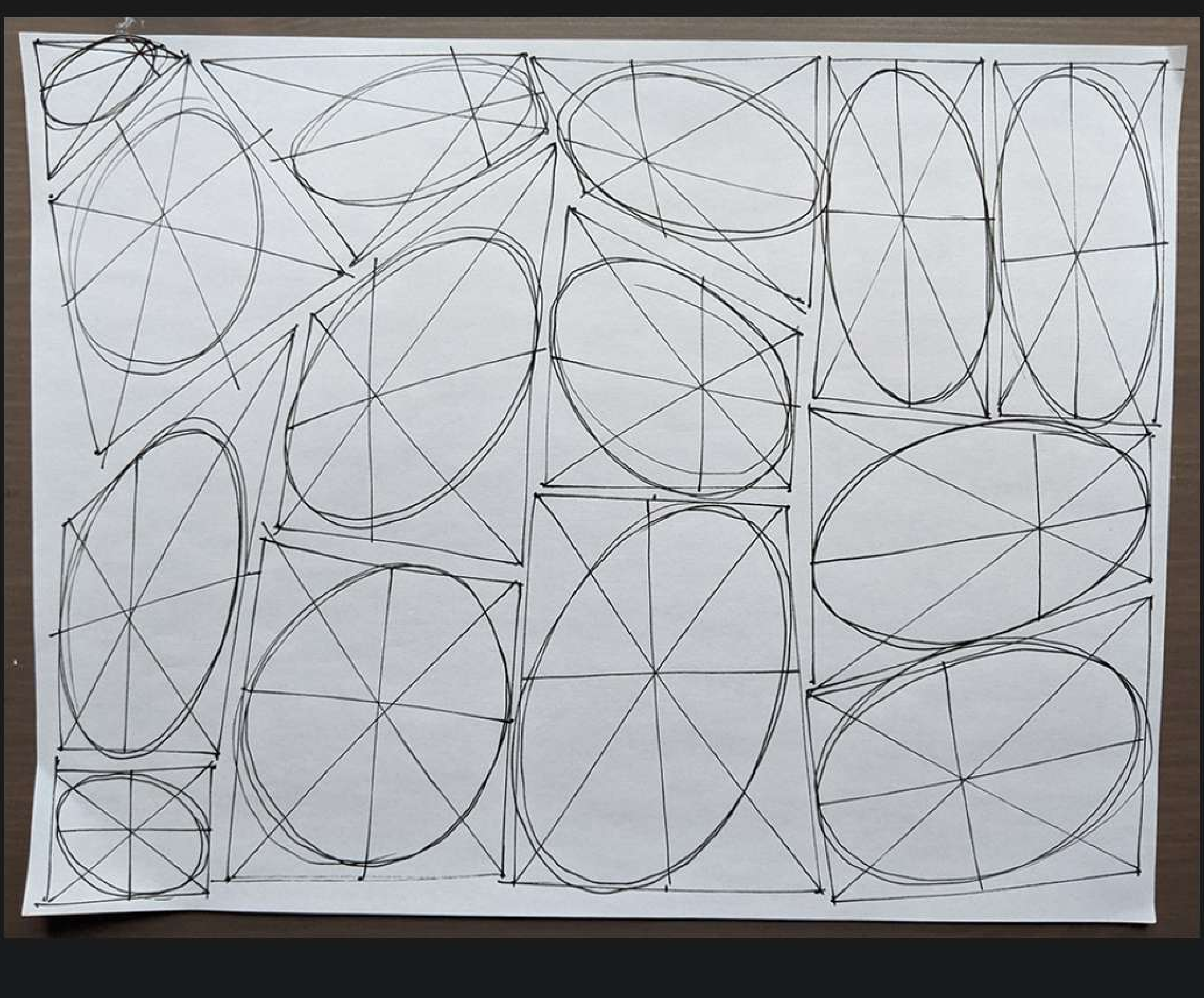


Mistake: Floating ellipse

I also see this every now and then, though less frequently. While getting the ellipse to touch all four edges is your second priority, it is still something you should strive to do. It's pretty clear that with this example, no attempt was made to achieve that goal, and the ellipse - though evenly shaped - was just plopped in the middle rather unceremoniously.

Example homework

Here's what your page should look like once it's done.



<<< Ellipses

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They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

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Some Quick Reminders
- Video vs. Text
- But Comfy! I have trouble with reading!

Lines: Using Your Arm
- Drawing from your wrist and shoulder
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- The pivots of the arm
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Lines: Homework
- Don't forget!
- Homework and exercises

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- Minor axis
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- Not a perspective course
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- Foreshortening
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- 3 point perspective simplified

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- Horizon line, eye line, axis
- Distortion
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Boxes: Homework
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What Next?

Lesson 1: Lines, Ellipses and Boxes

Funnels

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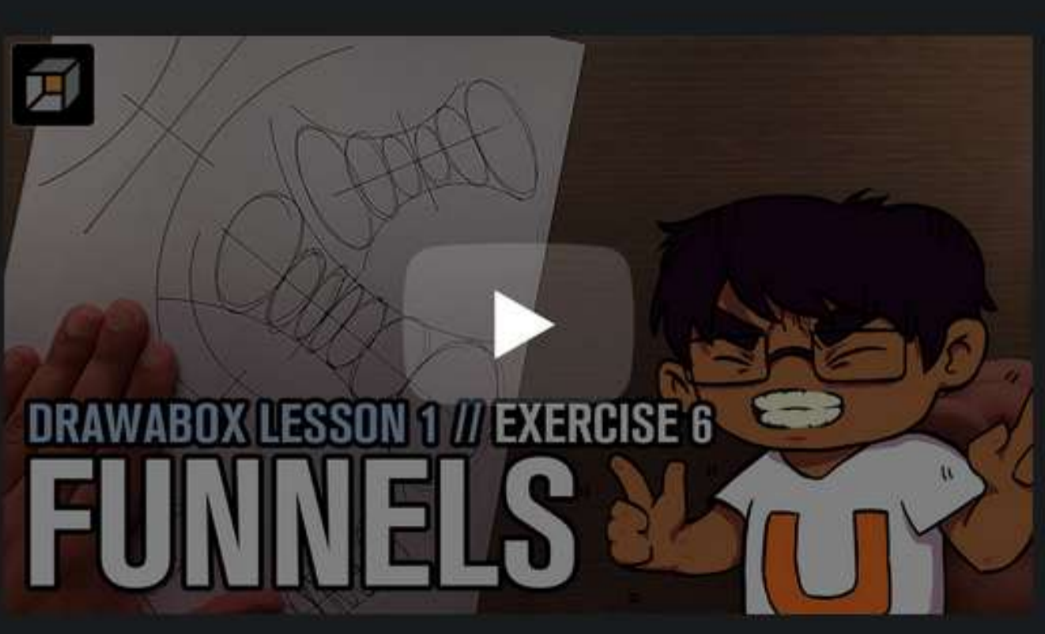
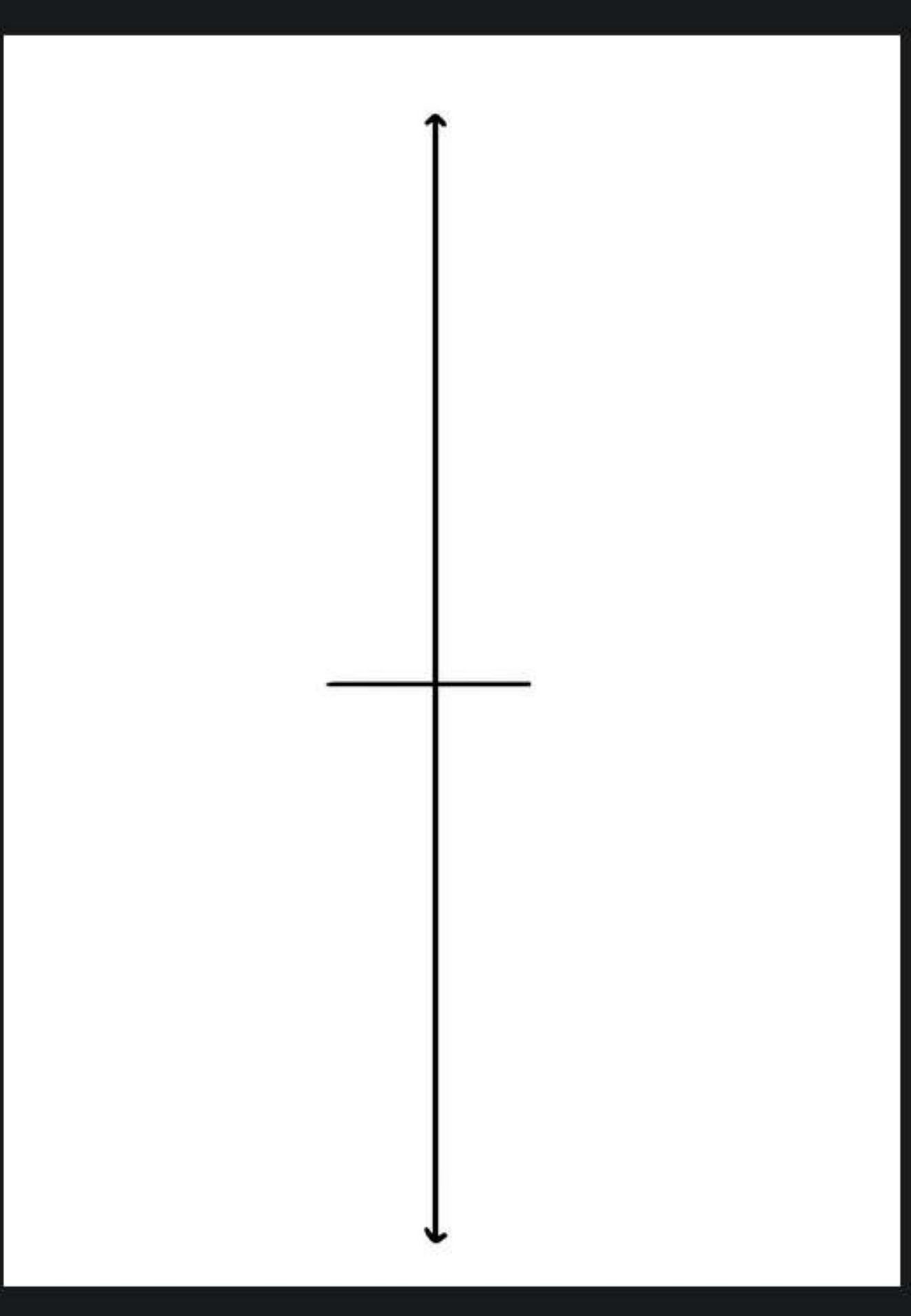
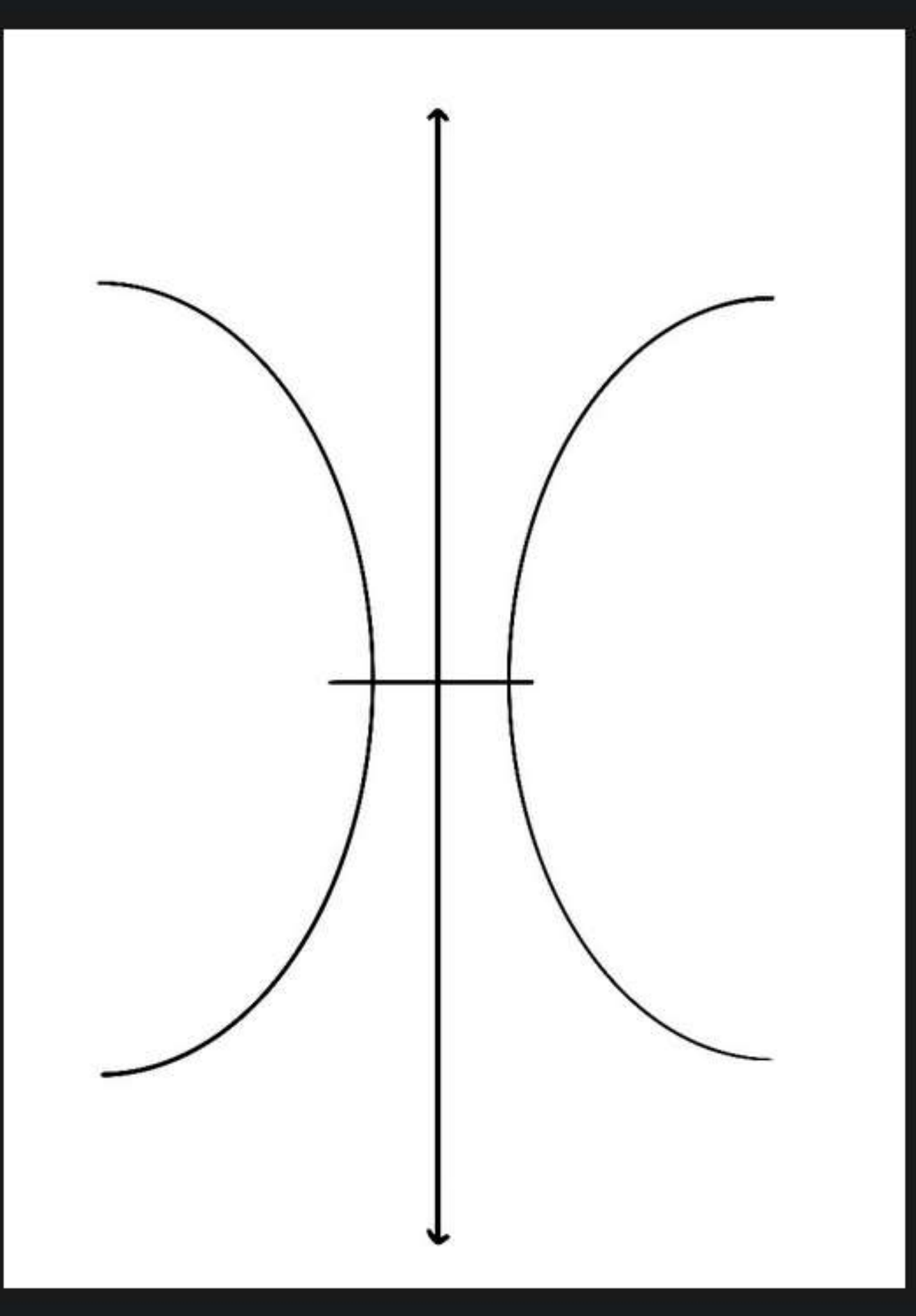


This exercise is similar to the others, but throws a couple curve balls along the way and leads into an exploration of how the minor axis can be used to align our ellipses.



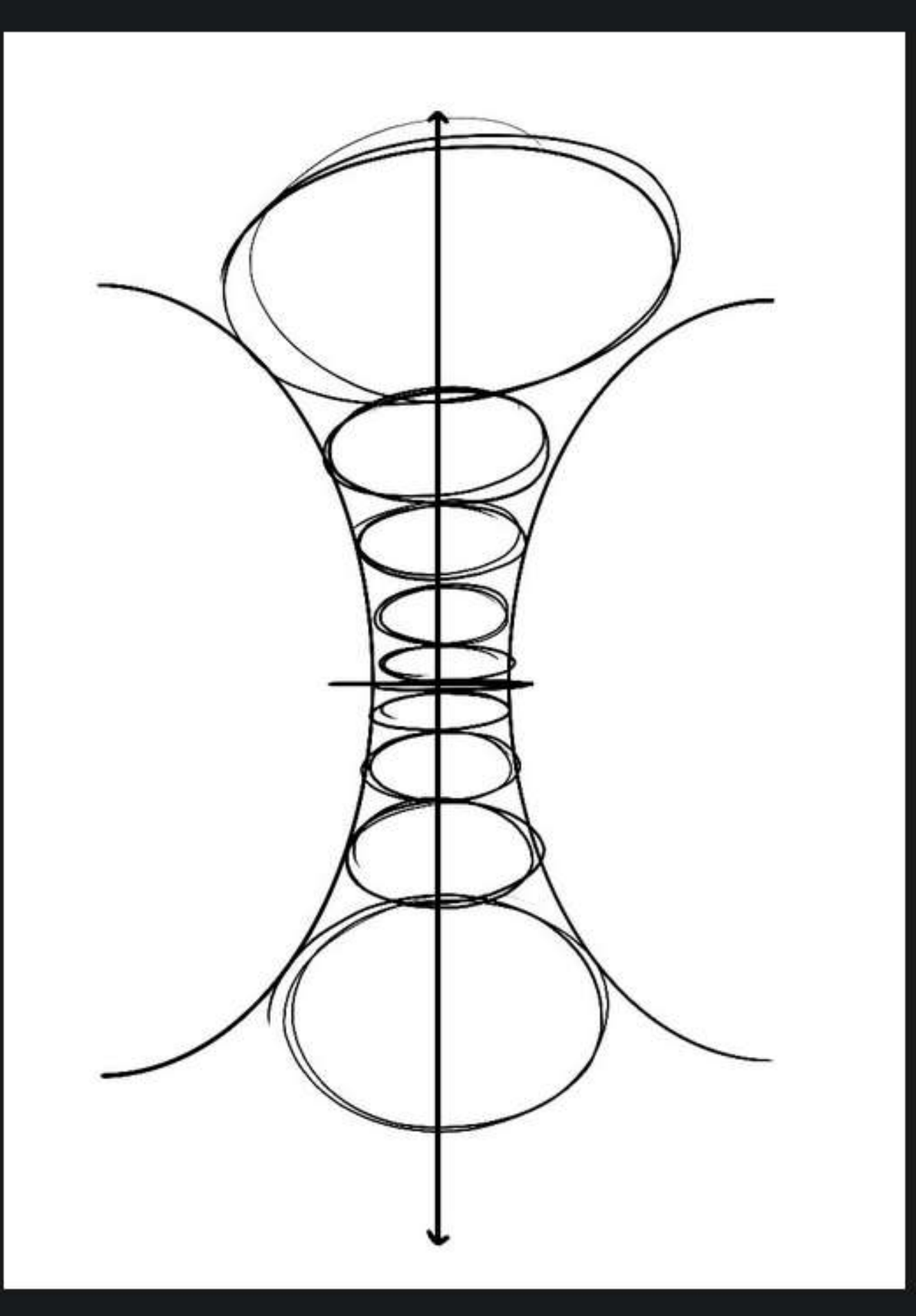
Start out by drawing a long line with a shorter one across it marking out its middle (roughly). This long line is going to be the minor axis we use to align the ellipses we draw later.

It's worth mentioning that you should use a ruler or straight edge to draw these two lines. The ellipses will be freehand, and we want to focus on one thing at a time.



Along either side of the long line, draw an arc. This can actually be pretty difficult - it may be easier at first to just draw the arcs first and then place a line in between them. Alternatively, if you can find a large circular object, or something else to help you draw those curves, by all means, go ahead. Again, we're not practicing our freehand curves right now.

You'll find that in between these two arcs, we've created a sort of funnel shape.



In the space inside of the funnel, draw your ellipses. Strive to keep them aligned to the central minor axis line, such that each ellipse is cut into two equal, symmetrical halves down their narrower dimension by it.

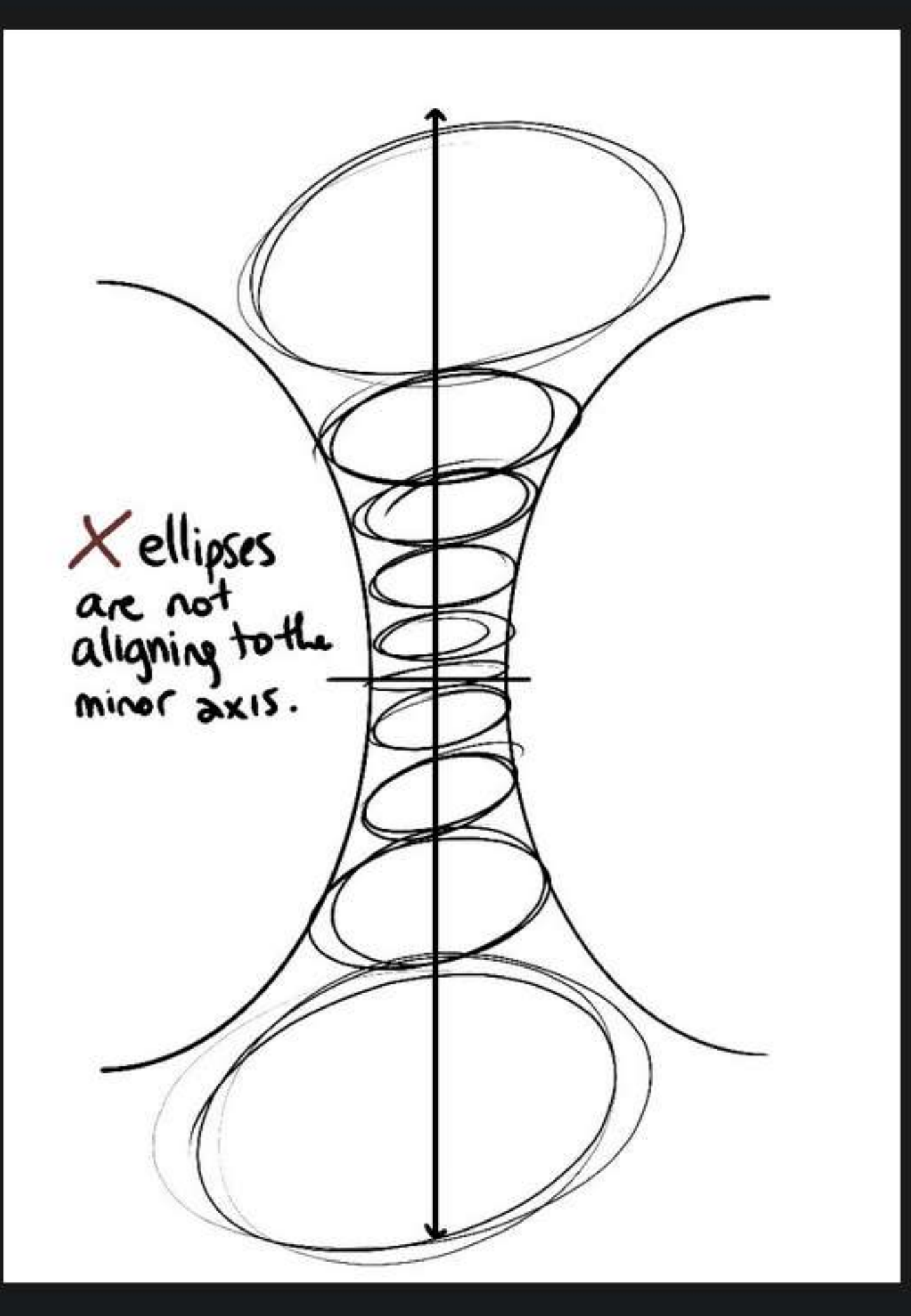
Optionally, you can try to get the degree of your ellipses to increase as you move outwards from the center - keeping the middle one at a low degree (very narrow), and towards the outside, much more circular. Again, this is optional - you don't need to worry about this if you're still struggling with the alignment of your ellipses.

Purpose of this exercise

This exercise is really about getting used to the use of the minor axis line, as well as continuing to work on getting those ellipses to fit snugly within a set space. These are both principles that are used heavily in lesson 2, so we want to start getting a firm grip on them now.

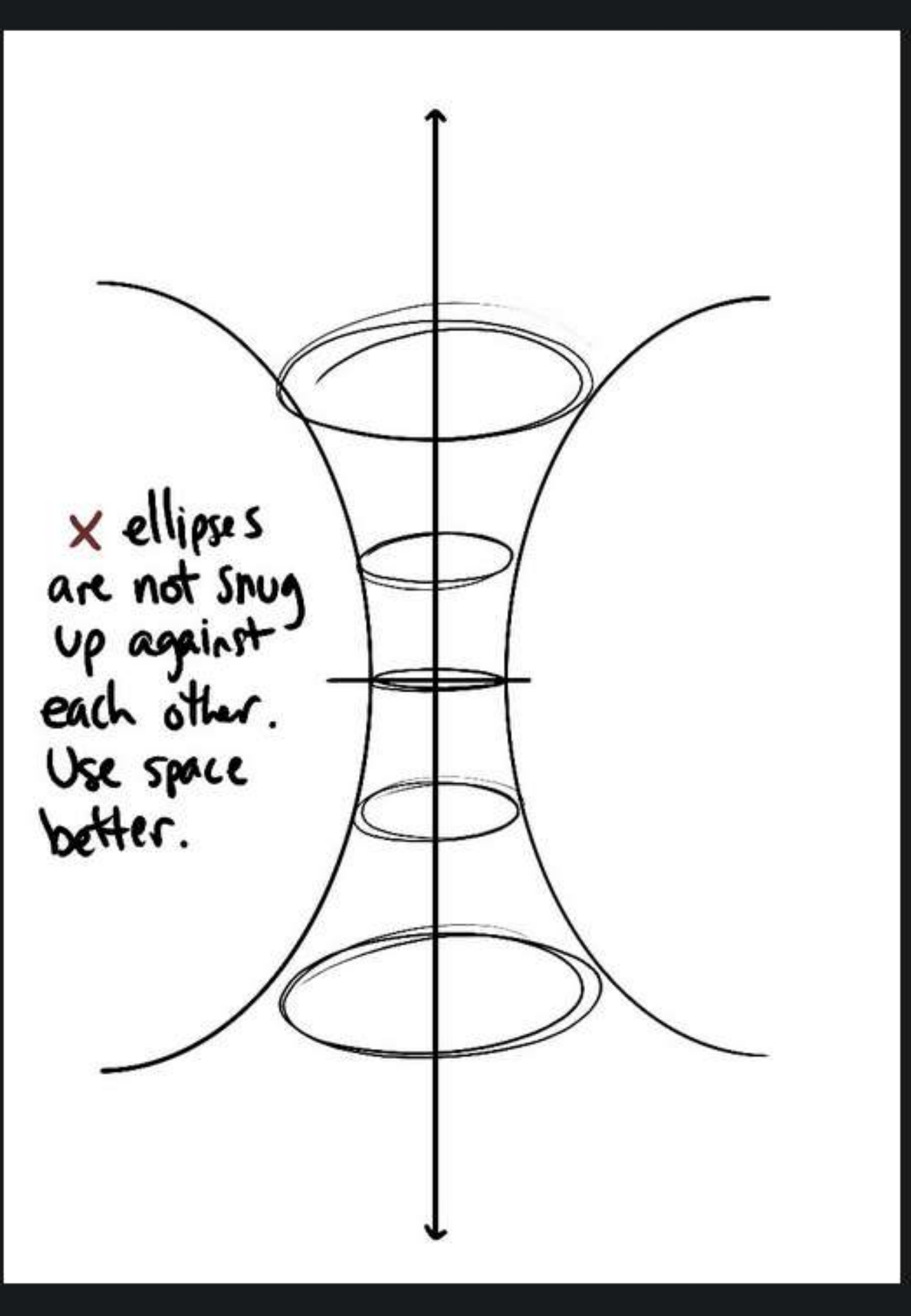
Things to remember

In this video, we look at the main issues that come up when students attempt this exercise, so you'll know what to try to avoid.



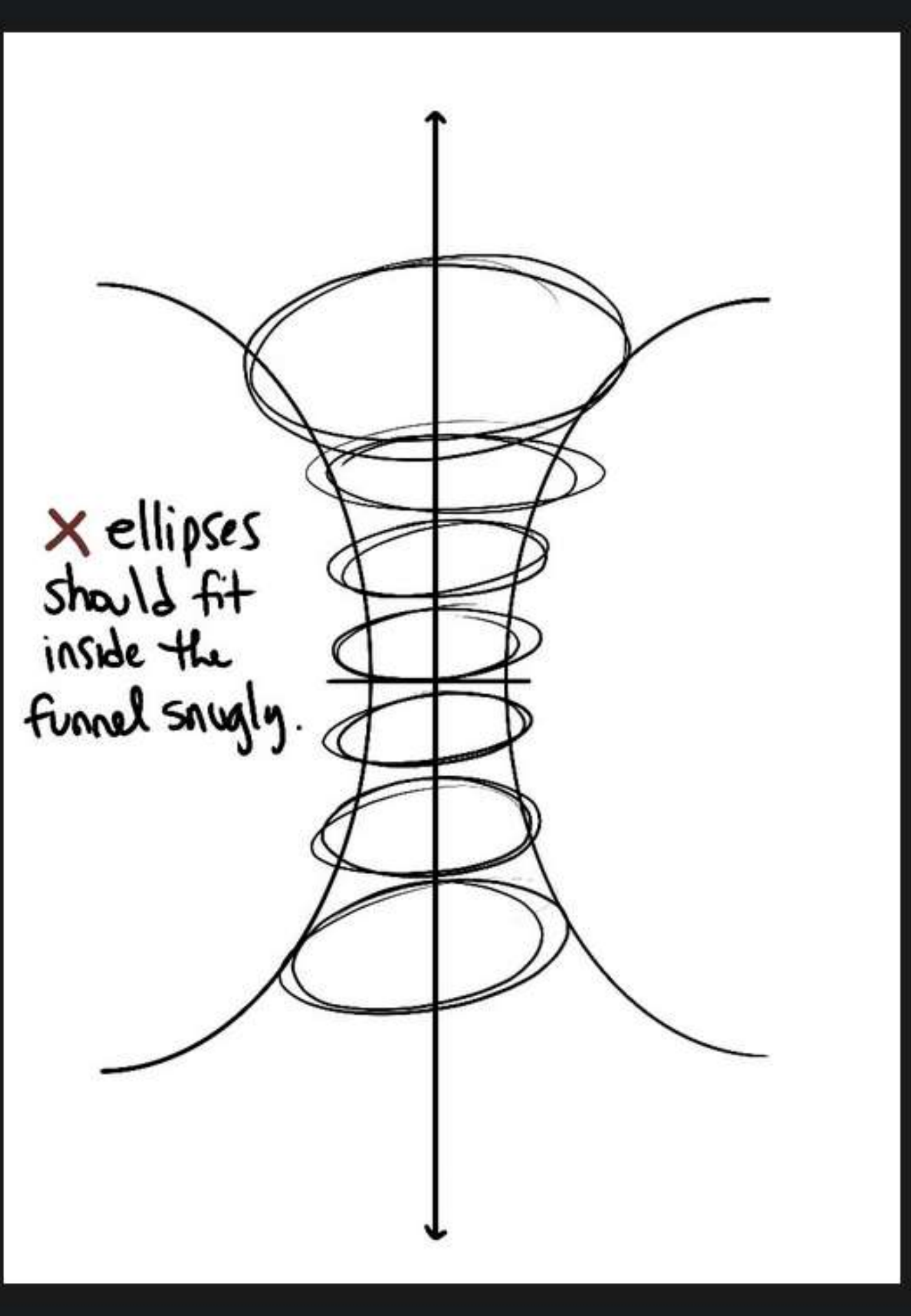
Mistake: Not aligned

This is easily the most common mistake I see in this exercise. As mentioned above, one of the core elements of this exercise is getting used to your ellipses aligning to the central minor axis line. You want to make sure that the minor axis cuts each ellipse into two equal, symmetrical halves, down their narrower dimension. Here you can clearly see that they're slanted and cut unevenly.


X ellipses are not snug up against each other. Use space better.

Mistake: Poor spacing

Keep your ellipses snugly against one another - don't leave large spaces between them (or any space at all for that matter). If nothing else, it's a missed opportunity to get more practice in with your ellipses.



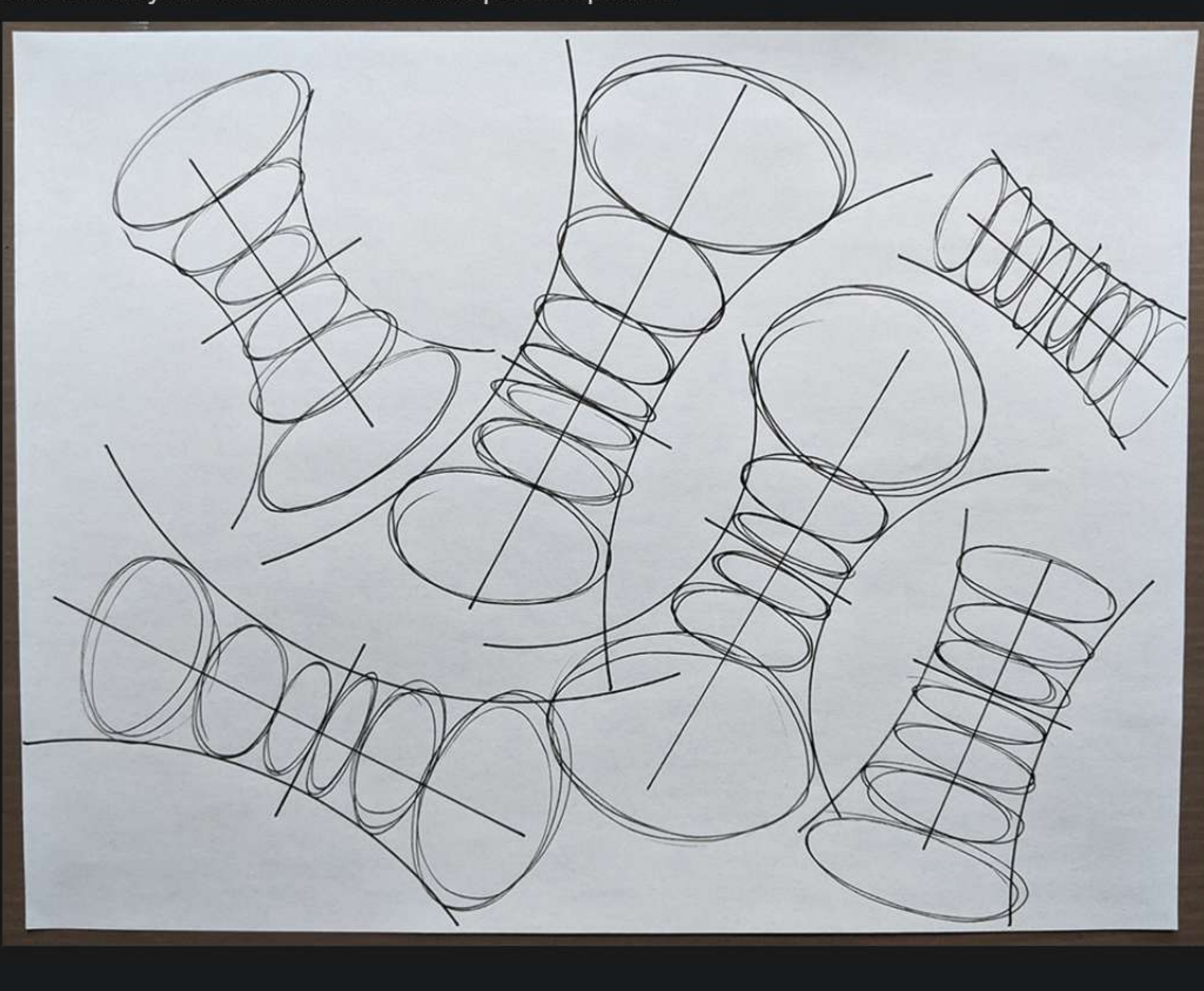
Mistake: Being too loose

Do your best to keep your ellipses snugly within the funnel shape. Here many of these ellipses are spilling out beyond the funnel.

As we get into organic forms in lesson 2, this is going to be rather important, as we'll be using similar techniques to simulate the illusion that we have curving lines running along the surface of forms to make them look more three dimensional. If those lines spill out of the form however, that illusion will be easily broken.

Example homework

This is what your work should look like upon completion.



Whew, I'm almost done. Just one exercise left before I can move onto.. boxes? Damnit.

Come watch me struggle through this last bit of nonsense.

<<< Ellipses

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Lesson 1: Lines, Ellipses and Boxes

Boxes: The Basics of Perspective and Projection

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Boxes and perspective

Finally, we've reached this course's namesake - boxes, and by extension, **perspective**.

Perspective, which serves to help us depict 3D spaces on a flat page, is inextricably tied to boxes, for a very simple reason: where 3D space consists of three dimensions, boxes provide us with three distinct sets of edges, each of which flow in the direction of one dimension, and perpendicularly to the other two.

By focusing on boxes, we're able to use the principles of perspective as a starting point, and extract the core element we really want to focus on: an understanding of 3D space, and how we can go about capturing it on a flat page.

Not a perspective course

Firstly, it's important that you all understand what Drawabox is, and what it isn't. **Drawabox is NOT a perspective course**. Linear perspective is above all else a series of rules and techniques with extremely specific steps and considerations. Study the rules, remember the rules, and painstakingly follow the rules - and you'll be able to construct scenes that look and feel three dimensional. But that's not what we're doing here.

Drawabox is, as discussed in Lesson 0, all about developing students' spatial reasoning skills. This is something we are working to develop on an instinctual level. Everything we do throughout this course - even the constructional drawings we embark upon in Lessons 3-7 - are **exercises**. The goal is not to create pretty drawings, but rather to follow a process, follow a set of steps, that actively rewire the way in which your brain perceives and approaches 3D space.

The difference is that while most perspective courses will arm you with a ton of things to keep in mind *as* you're working through a drawing, with the purpose of *consciously* applying those concepts, **what we're doing here is training and shaping your instincts, so that when you do draw your own things, you can focus not on *how* to execute a particular mark, or how to construct a given form, but rather *what* it is you actually want to draw**. The rest will have been practiced to such an extent that it will be second nature, freeing your brain's mental resources to focus on deciding what it is you actually wish to depict, how to go about designing it, and so on. Not the nitty-gritty of how a particular line gets from point A to point B.

> That doesn't mean Drawabox is *better* at teaching perspective - it's simply got a different goal. There's a lot of value in exploring Linear Perspective in its entirety, especially for when you encounter spatial problems that *need* to be nailed perfectly. This isn't something you'll encounter often, but having an understanding of the rules, and what rules and techniques actually exist, will ensure that when you run into those situations, you know what to go searching for in order to solve those problems.
>
> Here are a couple courses from our sponsor, **New Masters Academy**, which can help provide a solid overview of Linear Perspective:
>
> - Linear Perspective Master Course with Erik Olson
>   This is one of the most comprehensive breakdowns of perspective you can find. Many courses don't go much farther than looking at 1/2/3 point perspective, but one of the things I love about Erik's course is that he dedicates an entire lesson to the idea that scenes and objects are not restricted to a maximum of 3 vanishing points - a concept that is often overlooked, or left to the student to figure out on their own.
> - Stress-Free Perspective Sketching with Sheldon Borenstein
>   This course focuses on the essential principles of perspective without getting lost in the technical stuff - it's great for going out and drawing scenes and buildings from observation, and a great way to learn to have fun and relax with your art.
>
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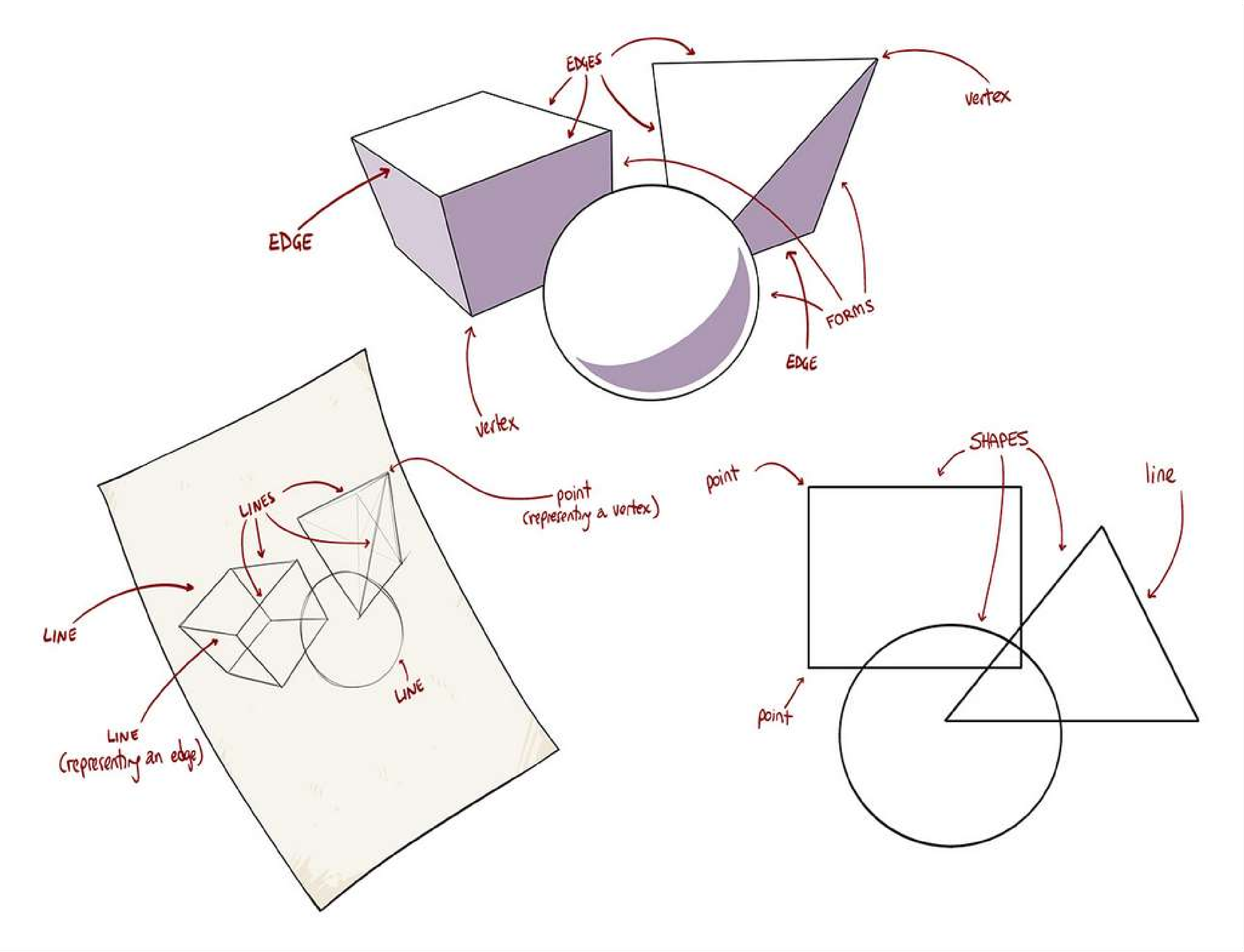


2D vs 3D

Drawing has always been a matter of taking things that exist in three dimensions - the human figure, the objects around us, animals, and every combination of those we can cook up in our imaginations - and figuring out how to capture them on a two-dimensional flat page. It's about going beyond seeing our drawings as a series of marks upon the page, but rather seeing the page itself as a *window*, looking out upon an three dimensional world that extends off in every direction to infinity.

This can very quickly become confusing, especially when pinning down exactly what the words we use when describing the problems we face really mean. So, in the interest of consistency, let's try to set out some guidelines on what certain common terms mean, and organize them into terms that refer to 3D elements, versus terms that refer to 2D elements.

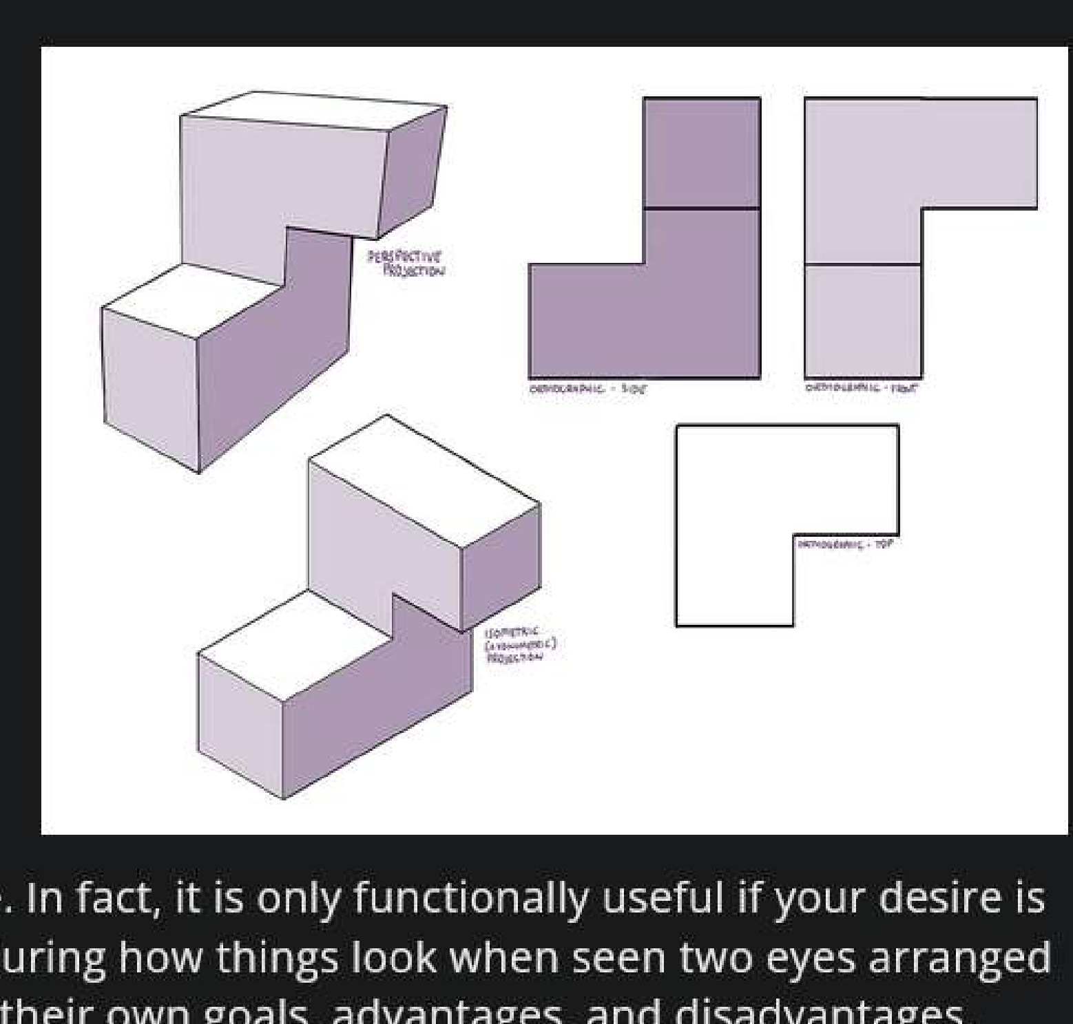
2D

- **Shape**. For our purposes throughout this course, whenever we use the word "shape", we're going to be referring to the flat shapes like squares, rectangles, circles, and triangles - that is, things that exist *only* in two dimensions.
- **Line**. This describes a path or stroke drawn on a flat surface. It only moves across the page itself as we're drawing.
- **Point**. This describes a dot placed on the page - like those we use to define the start and end points of our lines when employing the ghosting method. They exist exclusively in the two dimensions of the flat page.

3D

- **Form**. This denotes a three dimensional structure - like a box, a sphere, a pyramid, a cone, a cylinder, as well as more complex or organic structures. While we may draw a representation of a form on a flat page, we're still thinking about it as though it exists in 3D space.
- **Edge**. This refers to the hard separation between two distinct faces of a given 3D form. When drawn on a flat page, they're represented using *lines*, but we still need to consider how the *edge* being represented exists in three dimensions, and how it relates in three dimensions to the edges and forms around it.
- **Vertex**. The "corners" at which different edges meet in 3D space.

Projection



The act itself of taking something that exists in a 3 dimensional space, and capturing on a 2D surface - or taking anything that exists in some kind of "higher order" of dimensions and having it represented on a lower order of dimensions - is known as **projection**. In a manner of speaking, if you stand outside on a bright and sunny day and find yourself casting a shadow on the flat surface of the ground, you're effectively *projecting* yourself - a 3D object - onto a flat surface with no depth.

Perspective is *one* approach for projecting 3D space onto a 2D surface, but it's not the only one. In fact, it is only functionally useful if your desire is to replicate human binocular vision - that is, capturing how things look when seen two eyes arranged on a face. There are other approaches that have their own goals, advantages, and disadvantages.

- **Orthographic Projection**. This is an approach that uses multiple drawings of an object in order to capture and define how that object exists in space, but only ever depicting two dimensions at a time. So for example, you might be provided with a drawing of the top view, one of the side view, and one of the front view of an object, and using all of these images together we can understand the object in full.
- **Axonometric/Isometric Projection**. This is an approach that attempts to combine all of the information of a 3D object in a single drawing, by ensuring that every set of edges that are parallel in 3D space are also drawn as parallel to one another in 2D space. This is quite handy in video games, as things do not get smaller as they move farther away from the viewer - they remain the same size. This allows game artists to create tile sets that can continue in infinitely in any direction, without needing to change in scale.

<<< Ellipses
Boxes: Foreshortening and Vanishing Points >>>

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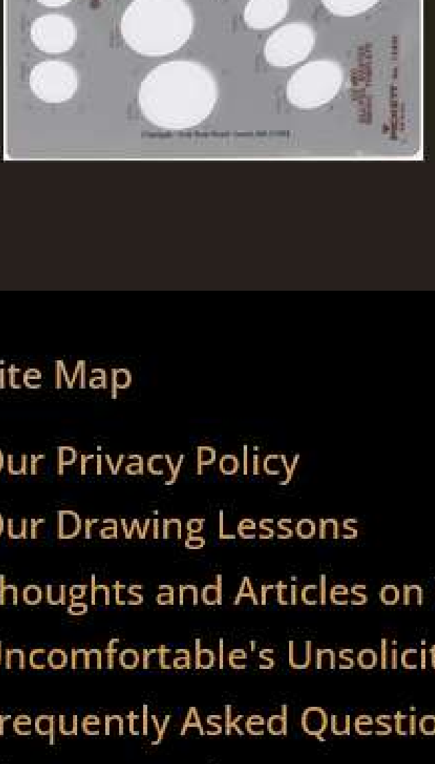

Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.

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DRAWABOX LESSON 1, PART 3
FORESHORTENING AND VANISHING POINTS

Conveying distance

The orthographic and axonometric projection methods shared on the previous page both feature a notable advantage over perspective projection - if you want to find out how long any of the lengths or distances are, you can simply grab a ruler and measure it out right there on the page. This makes them excellent for laying out the instructions on how to build a new table from Ikea, but not so great at capturing objects as we see them in our daily lives.

Perspective projection loses this convenience, in order to create a more realistic impression of how we see things, and in so doing it results in a problem: we need some other way to judge distances when looking at perspective drawings.

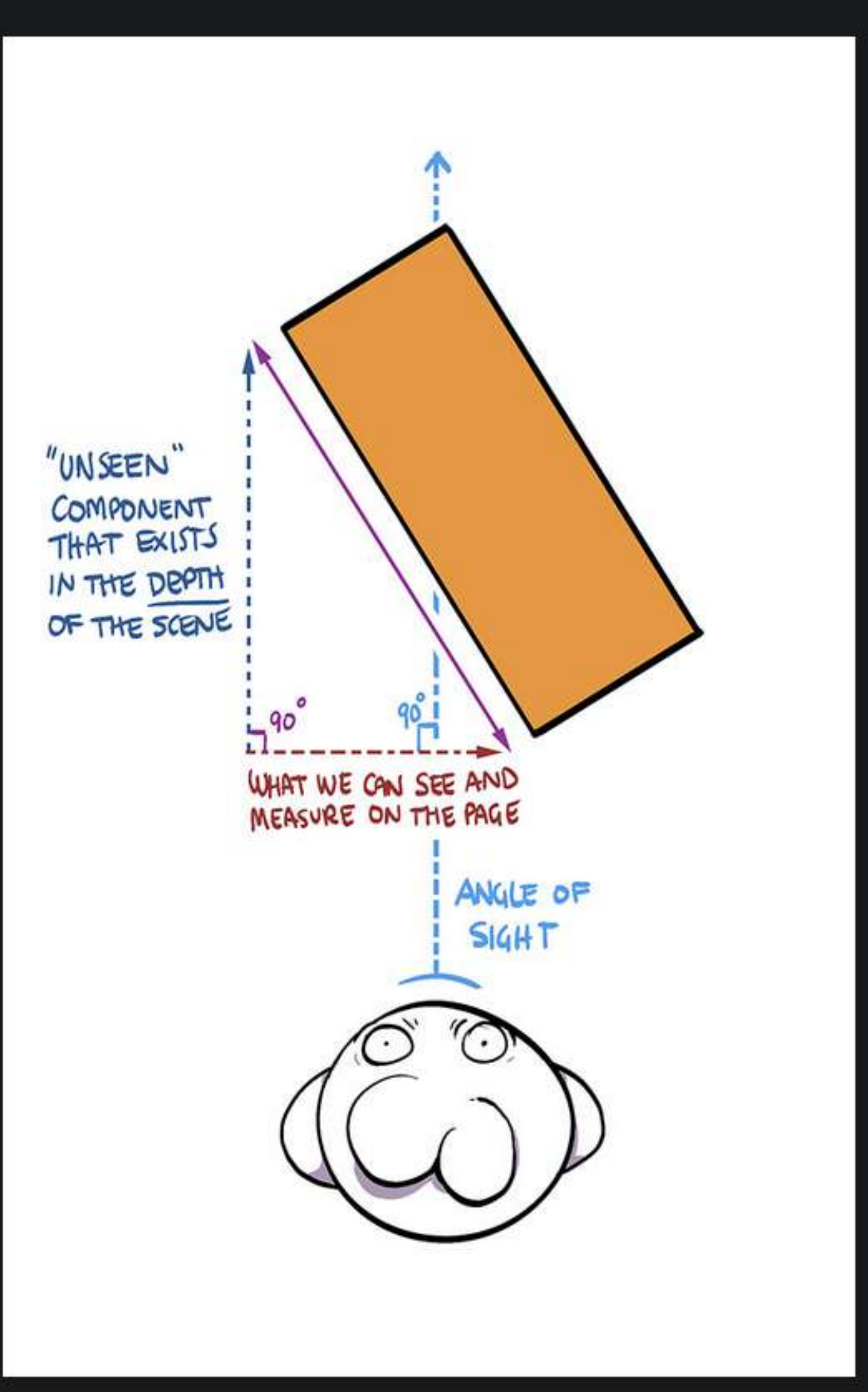
Foreshortening

In perspective projection, we can only usefully measure the length of edges that run fully perpendicularly to the viewer's angle of sight - basically, those edges that don't slant towards or away from the viewer through the depth of the scene.

For all the other edges that aren't restricted to this fairly limited set of orientations, measuring the length of the line on the page only gives us part of the story. We still have the other "unseen" component which cannot be perceived in the limited two dimensions we're drawing in.

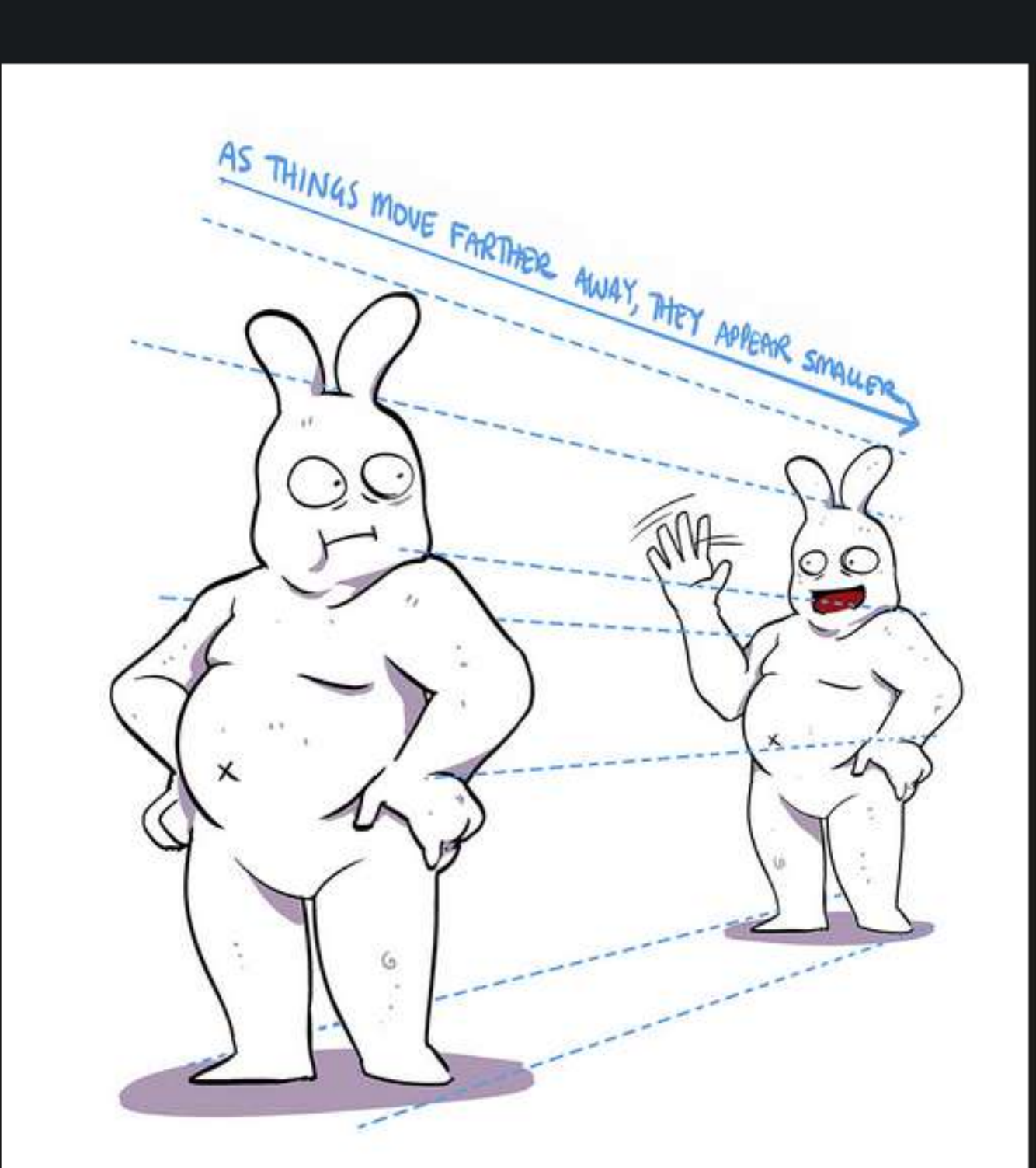
Foreshortening is the term we use to describe the *other* visual cues that can help us understand how much longer the edge actually is, relative to the part of it we're able to see.

We've actually already encountered one manifestation of foreshortening, where we discussed the "**degree shift**" in the context of ellipses and cylinders. There, the amount by which the far ellipse becomes wider than the closer end tells us whether the length of the given cylinder really is only as long as we can see on the page, or if there is considerably more being hidden.


"UNSEEN" COMPONENT THAT EXISTS IN THE DEPTH OF THE SCENE
90°
90°
WHAT WE CAN SEE AND MEASURE ON THE PAGE
ANGLE OF SIGHT

There is however another much more prominent way in which we can see how "foreshortened" the form is.

As things move farther away, they appear smaller

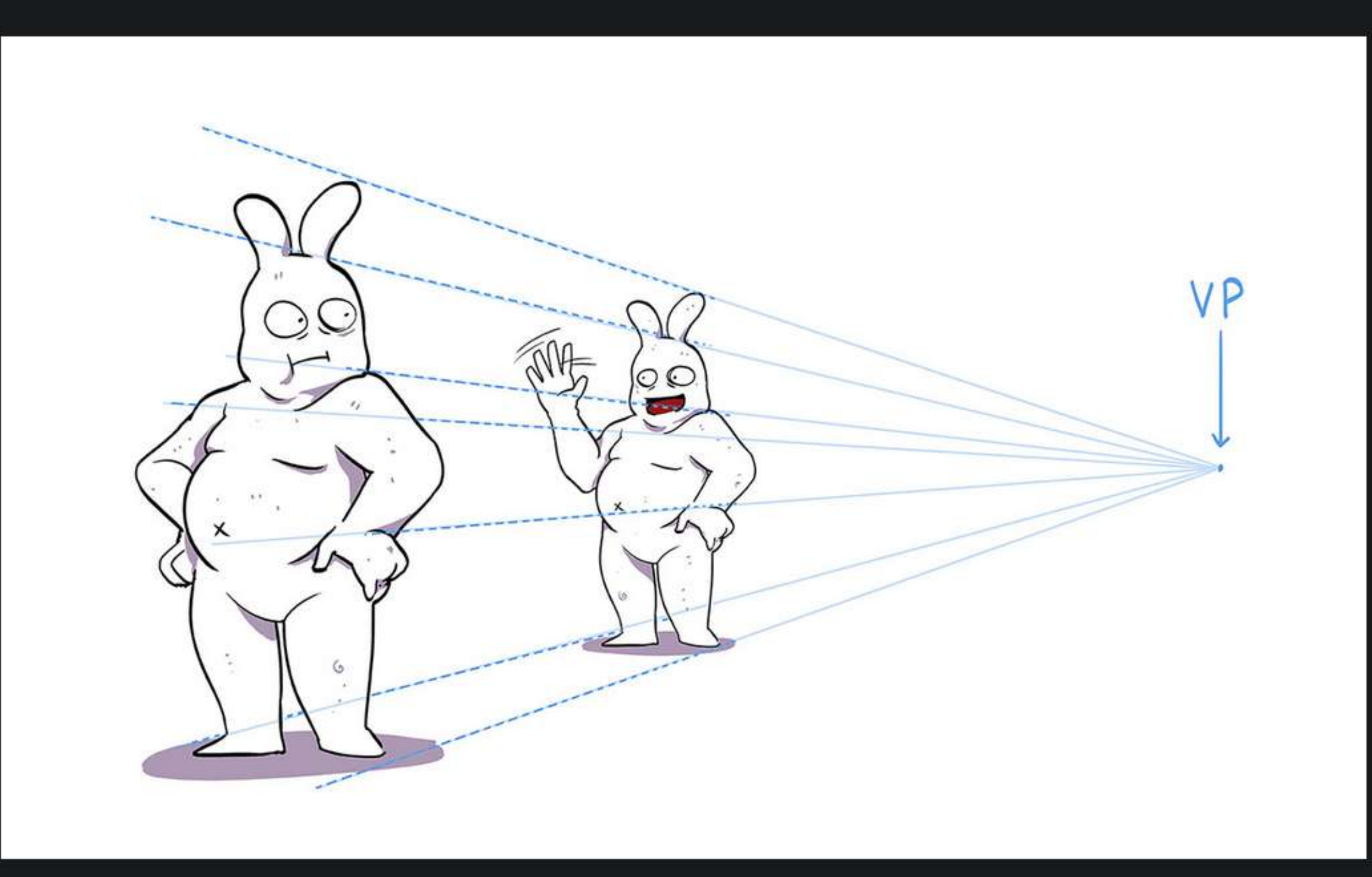

AS THINGS MOVE FARTHER AWAY, THEY APPEAR SMALLER

At the center of perspective projection, there exists a single rule from which every other rule stems: **as things move farther away, they appear smaller to the viewer**.

At its simplest level, we can think of this as it applies to whole objects - if an object is closer, it appears bigger, if an object is farther, it appears smaller. Beyond that however, this rule applies not only to those whole objects, but also to all of their individual components, **as well as the distances between those individual components**. As the object moves farther away, those individual components start pulling closer together.

The same goes for entirely separate objects - if two objects are placed 1 meter apart, and are moved away from the viewer while maintaining that 1 meter distance, for the viewer they will still appear as though that gap is getting smaller, the further back it moves.

Eventually, as these objects move so far away that the distance between them (which is still 1 meter in 3D space) will be imperceptible from where the viewer is. This point, where the distance between the objects appears to be 0 and the objects themselves converge together to a single point, is known as a **vanishing point**.



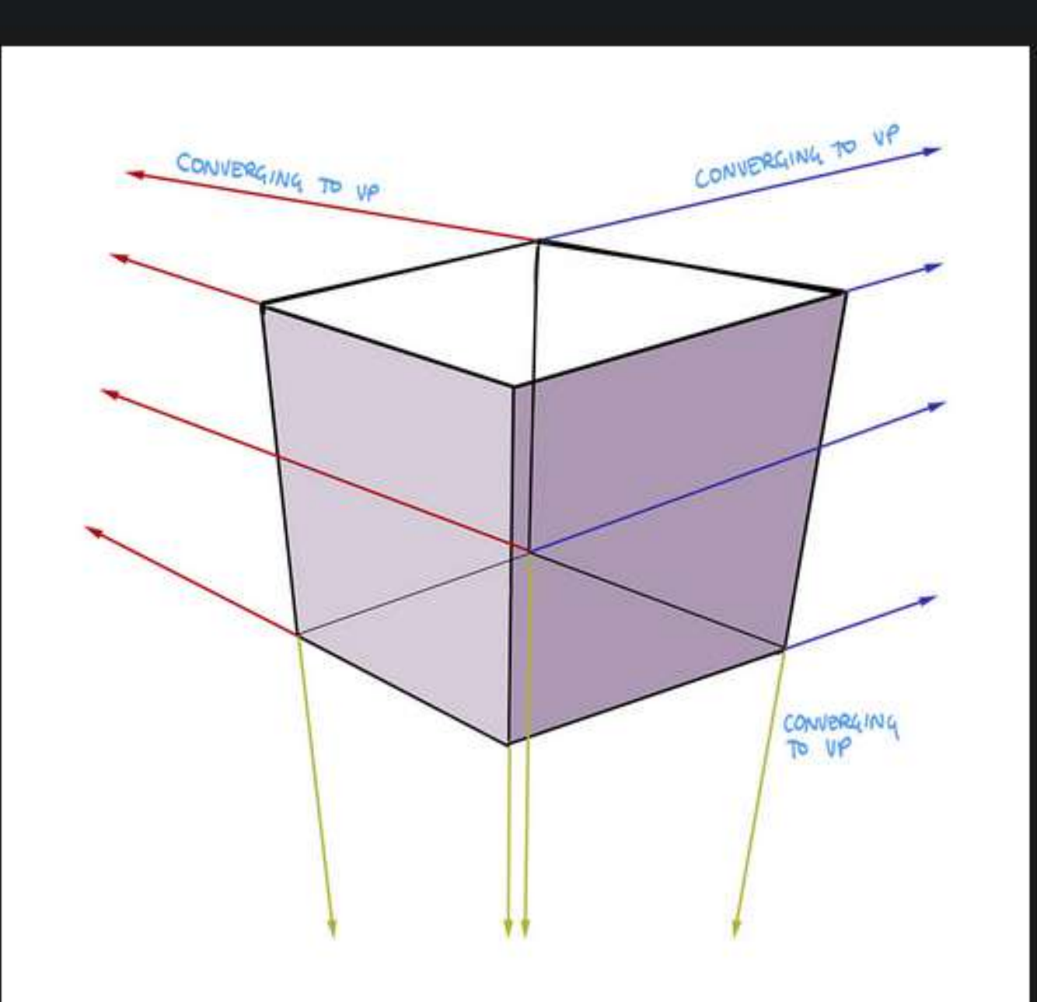
Vanishing points

A vanishing point is the point to which any set of parallel edges will eventually converge.

Looking at the example above, we have two characters of the same height positioned at different distances from the viewer. We can plot a series of parallel edges (in 3D space) from a location on the closer character, through the same location on the farther character - for example, from the top of one's head to the other's, or one's wrist to the other's, and so on.

If we continue to follow these edges, we'll find that from the viewer's eyes, the distance between those edges continues to shrink, until they all finally converge to a single point, which we've marked "VP".

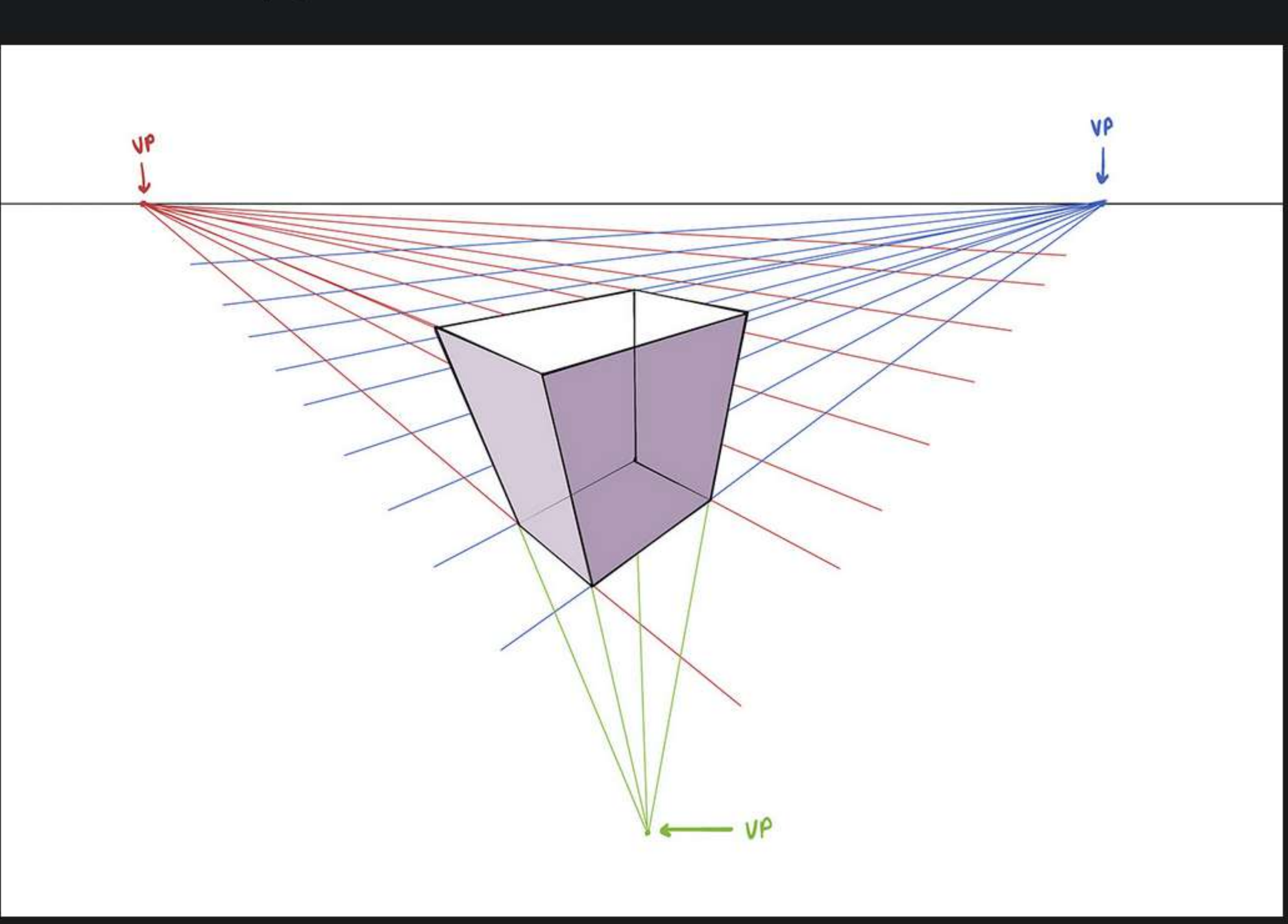
As applied to a box



Looking at the same situation, but with a simple box, we can see how it features 3 separate sets of edges, which matches up with our X, Y, and Z dimensions of 3D space. Each set is composed of edges that are parallel to one another in three dimensions, and which converge towards their own shared vanishing point when drawn as lines on a flat page.

It's how quickly these converge (and how far off, or how close, the vanishing point actually is to the form in question) that allows the viewer to gauge how long each edge actually is.

The more rapid the convergence (we sometimes refer to this as "dramatic" foreshortening), the more of that edge exists in the "depth" dimension, and so the longer it physically is. The more gradual the convergence (which we refer to as "shallow" foreshortening), the closer the edge's length is to what we can actually see and measure on the page.



Horizon line

While in this course we are not particularly interested in being hyper accurate with where exactly our vanishing points fall, there are some basic rules of thumb that we can keep in mind, which revolve around the concept of the "horizon line".

While the horizon can mean a few different things (we'll get into that a little later), for our purposes here, we can define it as the far end of our ground plane. That is, the far end which is *infinitely* far away. In this context, the ground plane is just a flat surface upon which we're standing, with our head level (not tilted in any way).

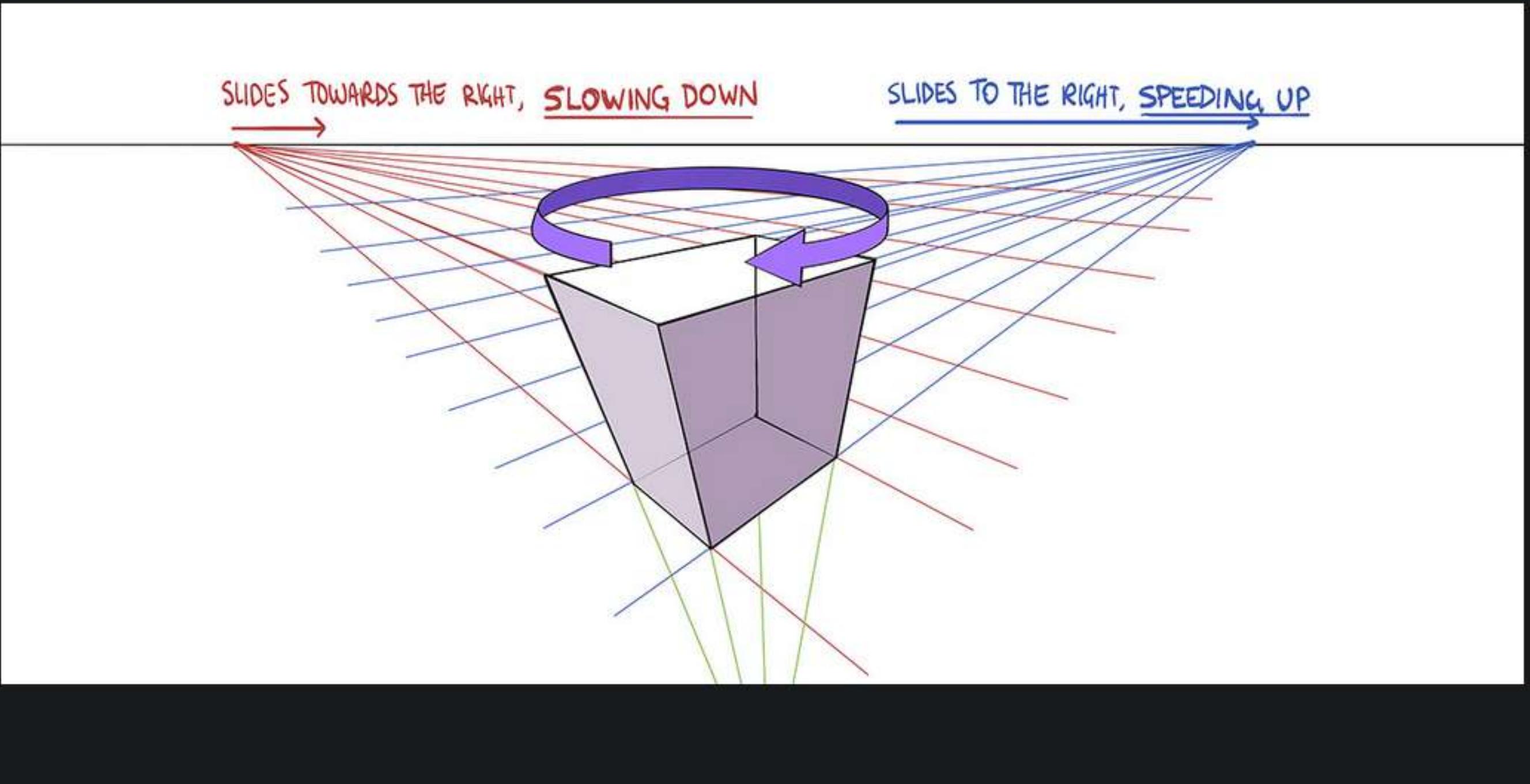
- If the set of edges governed by a given vanishing point runs parallel to the ground plane, **then that vanishing point will fall somewhere on the horizon line**. We can see this in the example above for the vanishing point to the far left, and the one to the far right.
- If the set of edges in question is tilting upwards relative to the ground plane, then the vanishing point will be somewhere above the horizon line.
- If the set of edges in question is tilting downwards relative to the ground plane, then the vanishing point will be somewhere below the horizon line - like the lower vanishing point in the example above, where the set of edges is fully perpendicular to the ground plane.

What happens when a set of edges rotates?

This is something we're going to delve into much more deeply in the next page, but there are two main things to keep in mind:

- A vanishing point's position in the composition depends on how the edges it governs are oriented in 3D space. So, if the edges rotate and their orientation changes, then its vanishing point will move. So for example, if as shown in the example below, we have box that is being rotated around its vertical axis, then the two sets of horizontal edges will rotate, resulting in their orientations changing. Since they're only rotating along the vertical axis, they won't tilt upwards or downwards - they'll remain on the horizon line, along which they will slide. As the box rotates clockwise, the vanishing points will slide towards the right.
- Though in the example below, both set of edges rotate by the same consistent amount, **their vanishing points will actually move at different rates**. How quickly they slide along the horizon depends on where in the frame they are - as the left vanishing point moves towards the center, it will slow down, moving less and less for every degree of the box's rotation. Conversely, as the right vanishing point moves further *away* from the center, and continues off past the right side of the compositional frame, it will slide more and more for every degree of the box's rotation.

While this - the fact that the VPs slide more further out to the side, and less closer to the center - is all we actually need to know in order to be able to rotate our forms accurately *enough*, in the next page we'll be using this peculiar behaviour to explore the concept of vanishing points "at infinity", and how they can lay the foundation for the 1, 2, and 3 point perspective grids that are commonly taught to students.


SLIDES TOWARDS THE RIGHT, SLOWING DOWN
SLIDES TO THE RIGHT, SPEEDING UP

<<< Boxes: The Basics of Perspective and Projection
Boxes: Rotation, Perspective Grids, and the Concept of Infinity >>>

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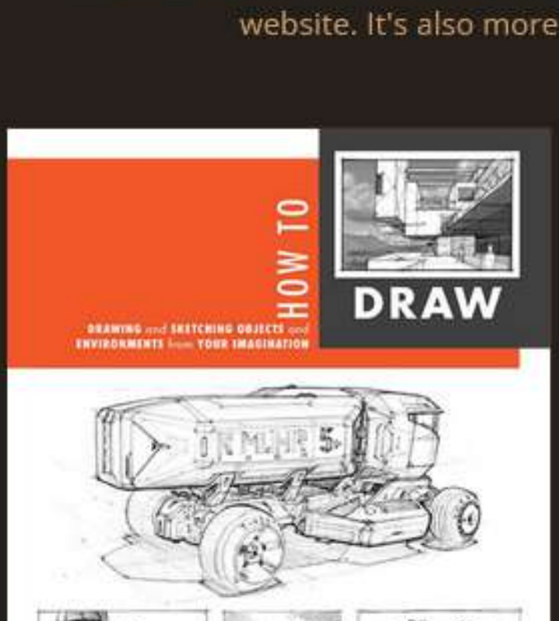

How to Draw by Scott Robertson

When it comes to technical drawing, there's no one better than Scott Robertson. I regularly use this book as a reference when eyeballing my perspective just won't cut it anymore. Need to figure out exactly how to rotate an object in 3D space? How to project a shape in perspective? Look no further.

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VIEW HOMEWORK SUBMISSIONS
SUBMIT HOMEWORK FOR REVIEW

Some Quick Reminders
- Video vs. Text
- But Comfy! I have trouble with reading!

Lines: Using Your Arm
- Drawing from your wrist and shoulder
- Old habits
- The pivots of the arm
- Let's keep it simple
- Do you mean I can't ever draw with my wrist or elbow?
- The path of least resistance
- Hover-hand
- How to hold your pen

Lines: Markmaking
- The Principles of Markmaking
- Marks should be continuous and unbroken
- But that artist uses chicken scratching all the time!
- Marks must flow smoothly
- Marks must maintain a consistent trajectory

Lines: Homework
- Don't forget!
- Homework and exercises

Ellipses
- What is an ellipse?
- 2D vs 3D
- Circles in 3D space
- Degree
- Degree shift
- Minor axis
- Normal vector
- Cylinders
- Homework and exercises

Boxes: The Basics of Perspective and Projection
- Boxes and perspective
- Not a perspective course
- 2D vs 3D
- Projection

Boxes: Foreshortening and Vanishing Points
- Conveying distance
- Foreshortening
- As things move farther away, they appear smaller
- Vanishing points
- As applied to a box
- Horizon line
- What happens when a set of edges rotates?

Boxes: Rotation, Perspective Grids, and the Concept of Infinity
- Understanding rotation
- How we look at the scene
- A different point of view
- Circular horizon
- Infinite vs non-infinite
- Vanishing point at infinity
- 0 point perspective does not exist

Boxes: Simplified Guidelines
- 1 point perspective simplified
- 2 point perspective simplified
- 3 point perspective simplified

Boxes: Additional Notes
- Foreshortening
- Horizon line, eye line, axis
- Distortion
- Placing vanishing points

Boxes: Homework
- Homework and exercises

What Next?

Lesson 1: Lines, Ellipses and Boxes

Boxes: Rotation, Perspective Grids, and the Concept of Infinity

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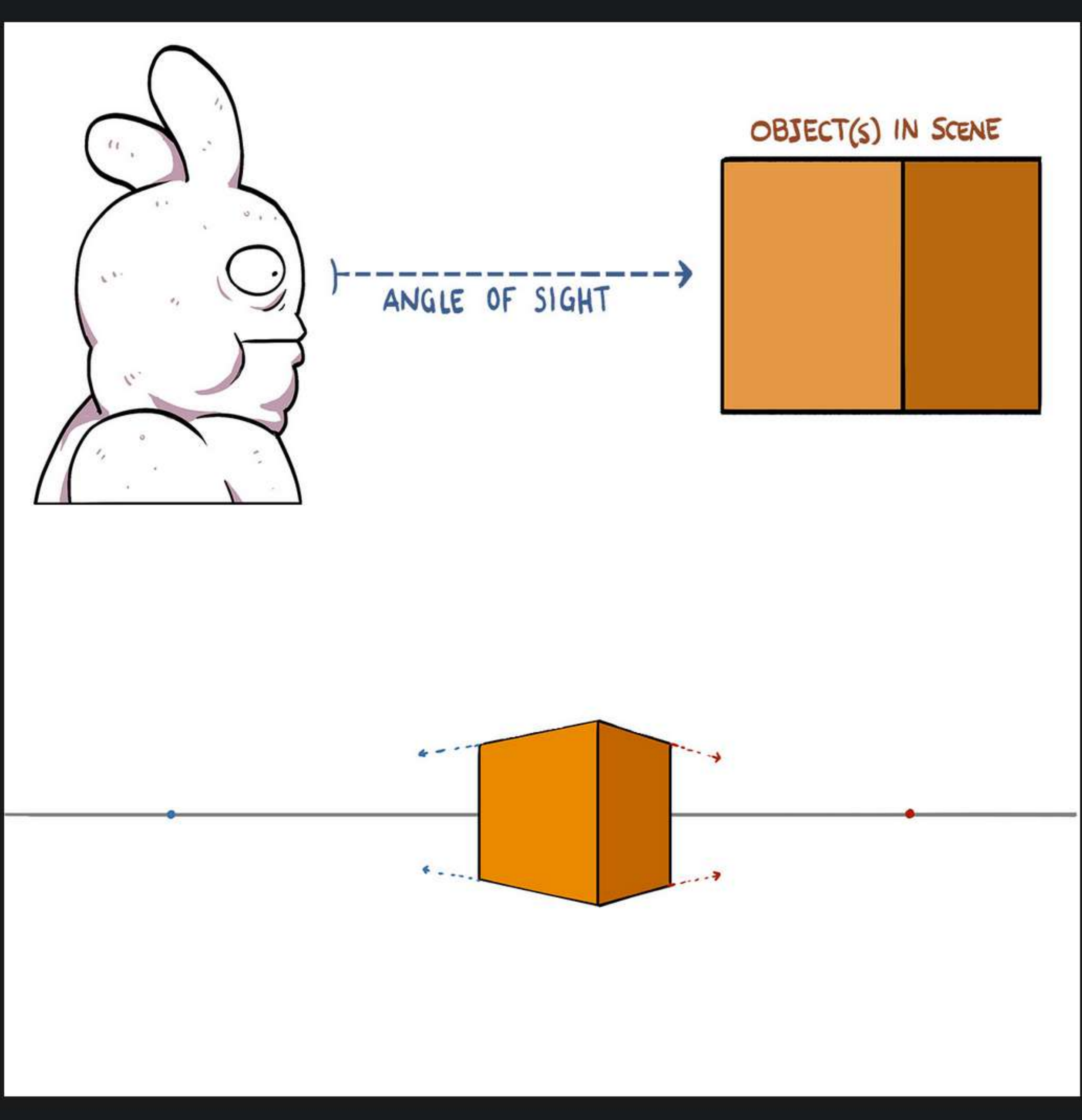
Understanding rotation

DRAWABOX LESSON 1, PART 3
ROTATING FORMS, PERSPECTIVE GRIDS, AND UNDERSTANDING TH
CONCEPT OF INFINITY

At the end of the last section, we looked at how vanishing points behave as the edges they govern rotate in 3D space. Here we're going to explore *why* they behave inconsistently (sliding along the horizon line at different rates depending on where along it they are).

The explanation for this will be quite heavily theoretical, but rest assured - it's a means to an end. It doesn't actually matter if you fully understand the logic behind it. Rather, the concepts we'll touch upon in exploring this matter will help us better understand some useful tools we have at our disposal when considering perspective.

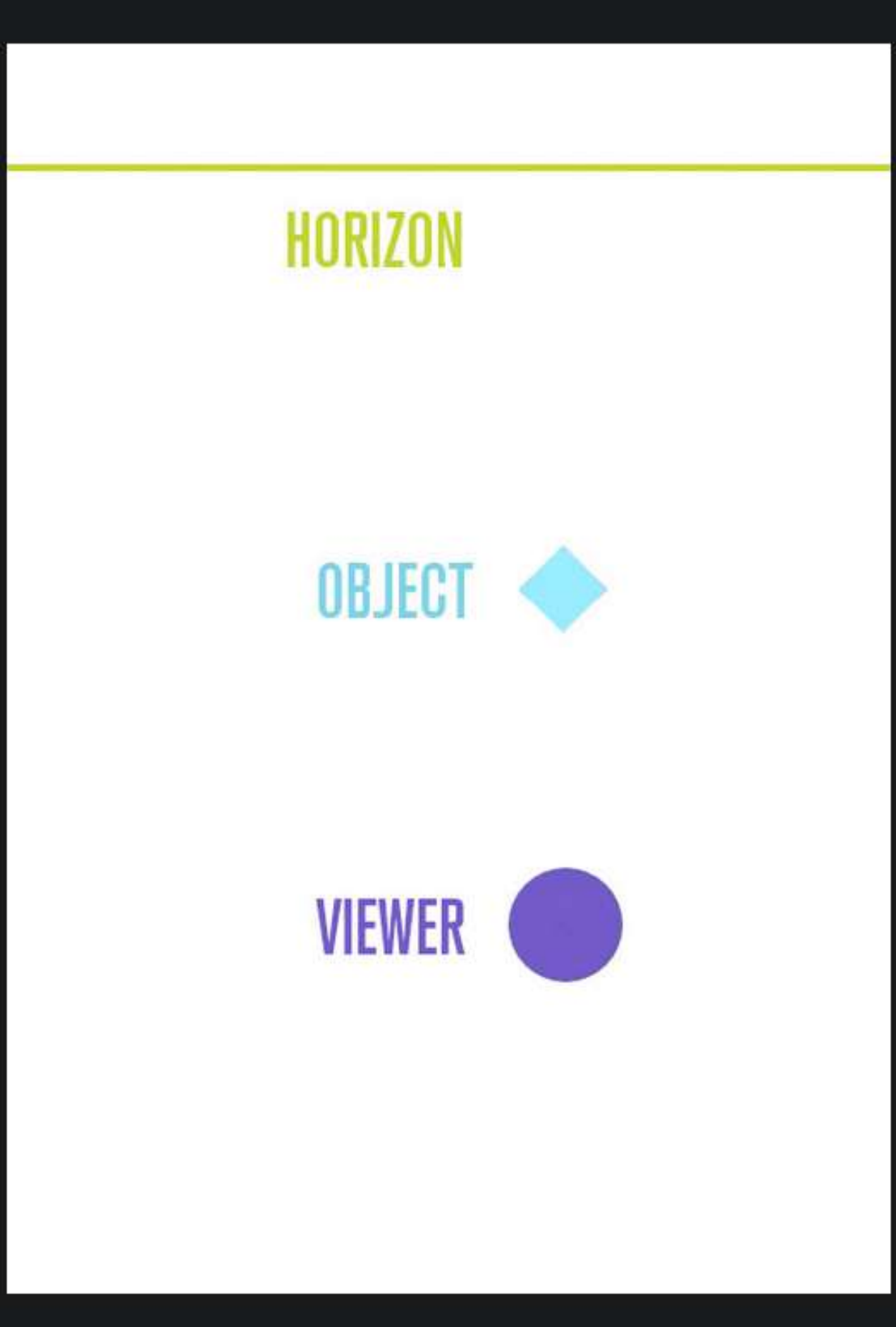


How we look at the scene

Normally when we look at a scene, it's through the eyes of a hypothetical viewer, looking in the direction of their "angle of sight". In the example image above, the top half shows this configuration, and the bottom half shows what the viewer actually sees - a box straddling a horizon line, with horizontal edges converging to vanishing points along it.

As we now know, if that box were to rotate about its vertical axis, those vanishing points will slide around inconsistently to one another, one moving more slowly, the other moving more rapidly.

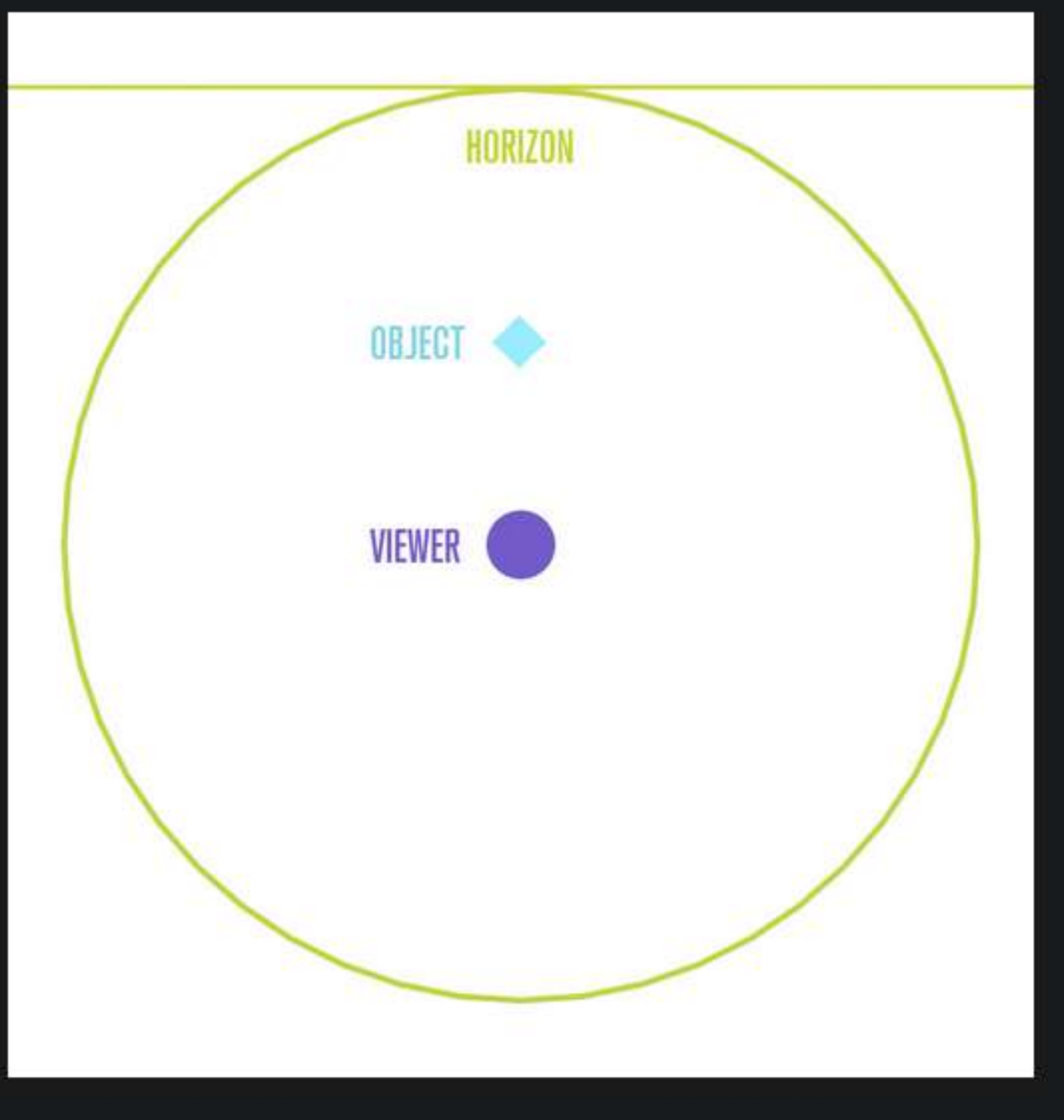
A different point of view



When exploring this particular issue, I find it to be more useful to look at the situation from above. As shown here, we have our viewer, the object they're looking at, and a flat horizon line.

There are however a couple of issues with how accurate this diagram is, so let's address those issues one by one.

Circular horizon

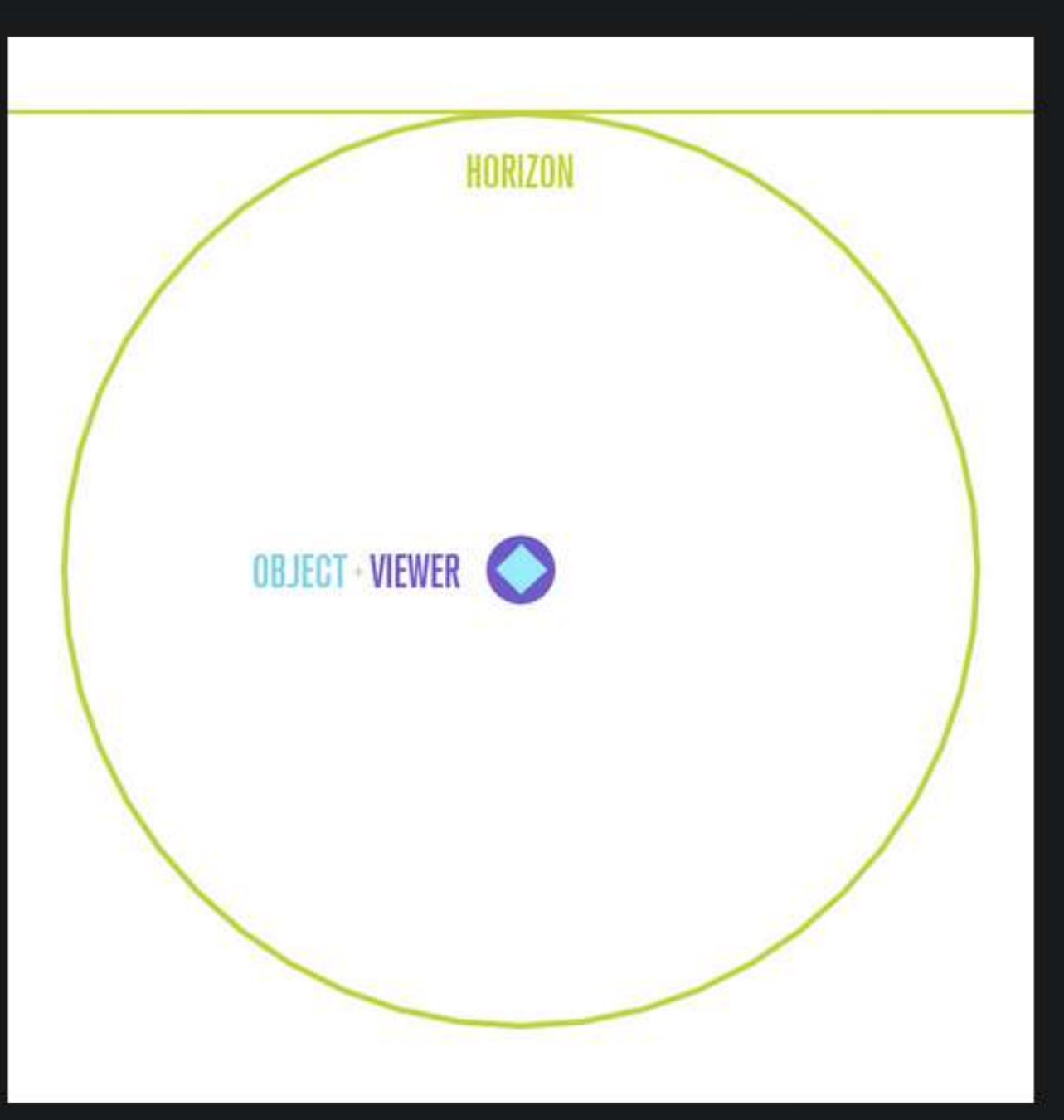


Firstly, we know that the horizon is, at all points along its length, *infinitely* far away from the viewer. Infinity is a tricky concept - it doesn't actually exist, but in theoretical mathematics, we treat it as though it is an actual concrete value, where one value of infinity is equal to any other value of infinity.

Looking again at the diagram from the previous step, representing the horizon as a straight line doesn't hold up to scrutiny - the distance between the viewer and the point along the horizon directly in front of it will actually be *closer* to than the points on the horizon off to the side.

We can correct this by representing the horizon line as a *circle* centered around the viewer. By definition, any point along a circle's perimeter is equally as far away from the circle's center as any other point.

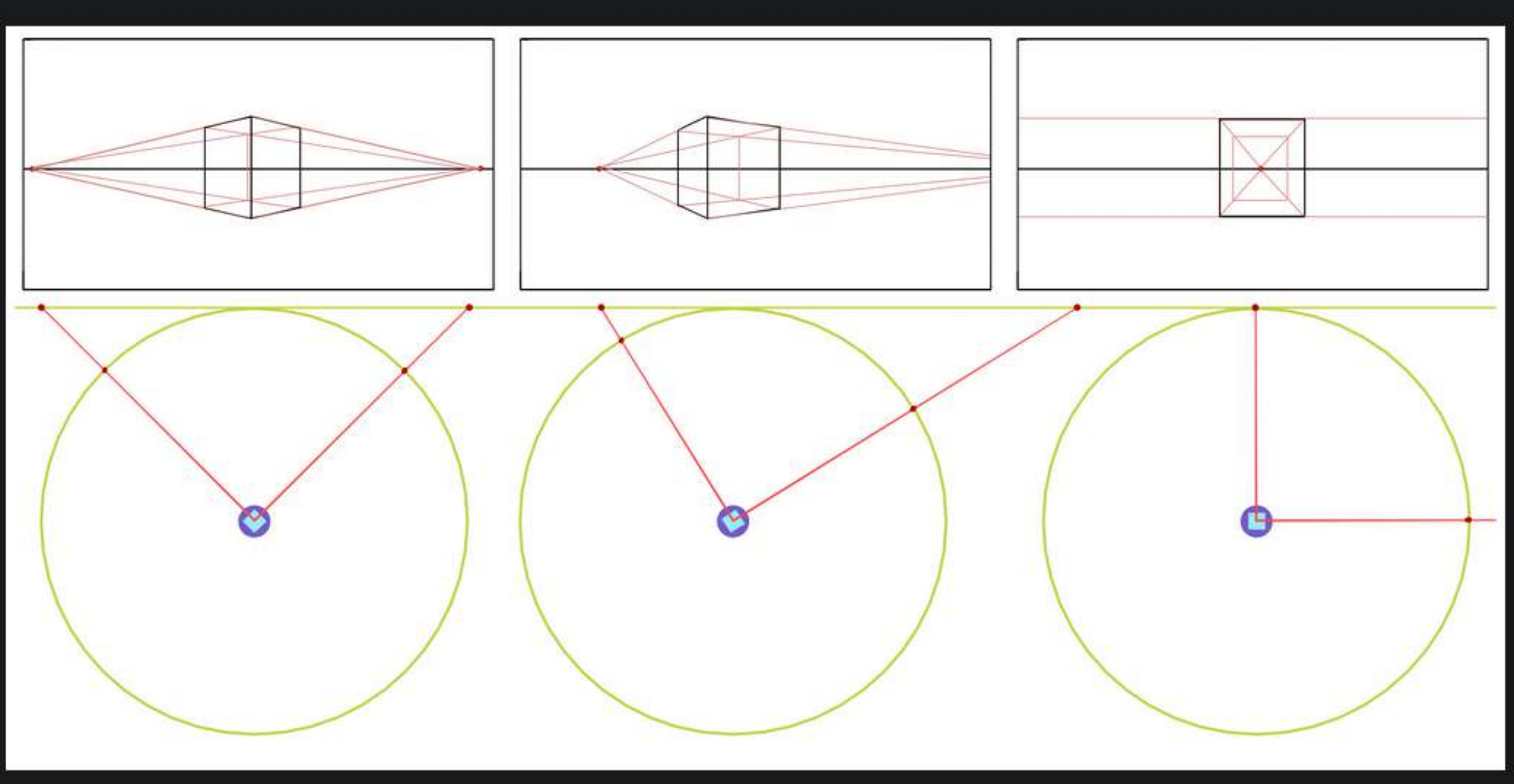
Infinite vs non-infinite



The other issue is that between the object and the viewer, there is a concrete, non-infinite distance, but between the object and the horizon, there is an infinite distance.

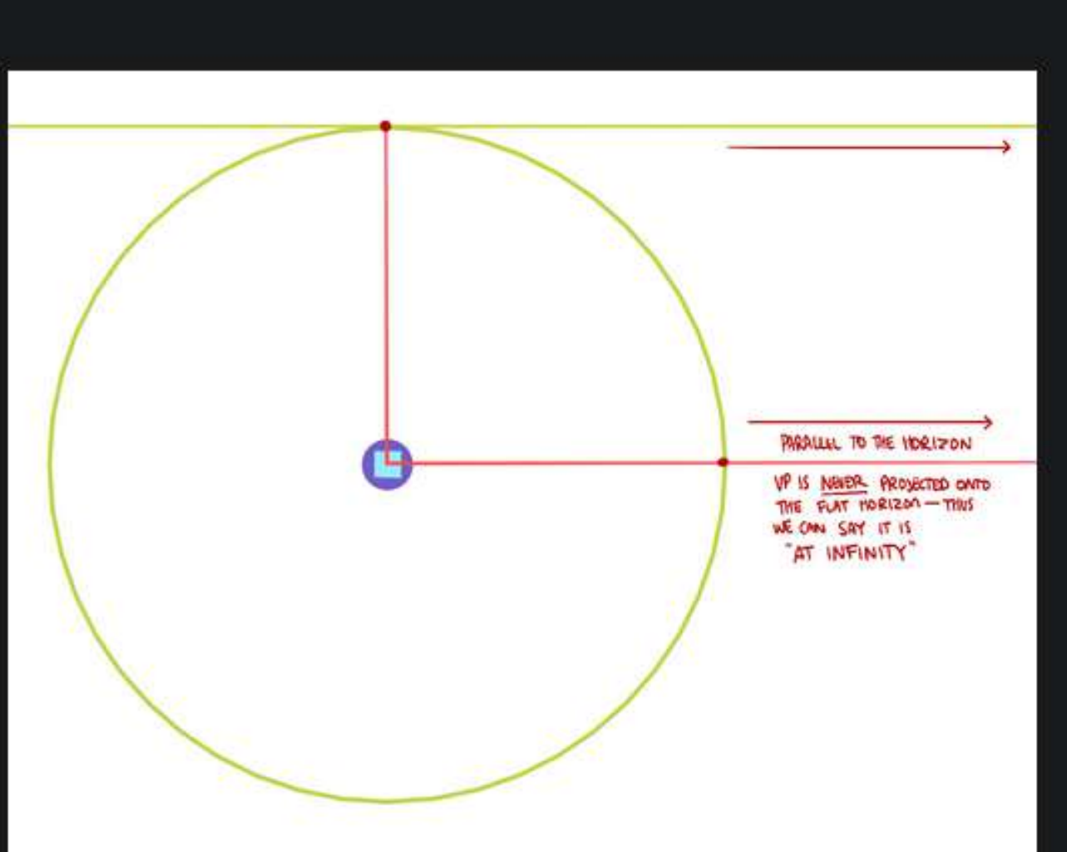
Again - reaching into the bag of fun that is theoretical mathematics - we know that any value of infinity is equal to any other value of infinity. Another fact we must consider is that infinity is *so* massive that no matter how big of a concrete value to subtract from it, it will not cease to be *infinitely* massive.

So, if the distance between the viewer and the horizon is infinity, and the distance between the object and the horizon is infinity, then the distance between the object and the viewer is really.. inconsequential. It could be miles upon miles, but in the face of infinity, it would still be nothing. Meaning, we can treat the distance between the object and viewer as being 0 at this massive scale, allowing us to combine their positions in the diagram.



With our diagram now correctly depicting these infinite distances, we can observe how the vanishing points behave on the circular horizon, as well as on the straight line when that horizon line is flattened out when our 3D scene is projected onto the flat page. Note how as the box rotates clockwise, while the vanishing points on the circular horizon move at a consistent rate, once projected onto the flat horizon the right horizon stretches out further and further.

Vanishing point at infinity

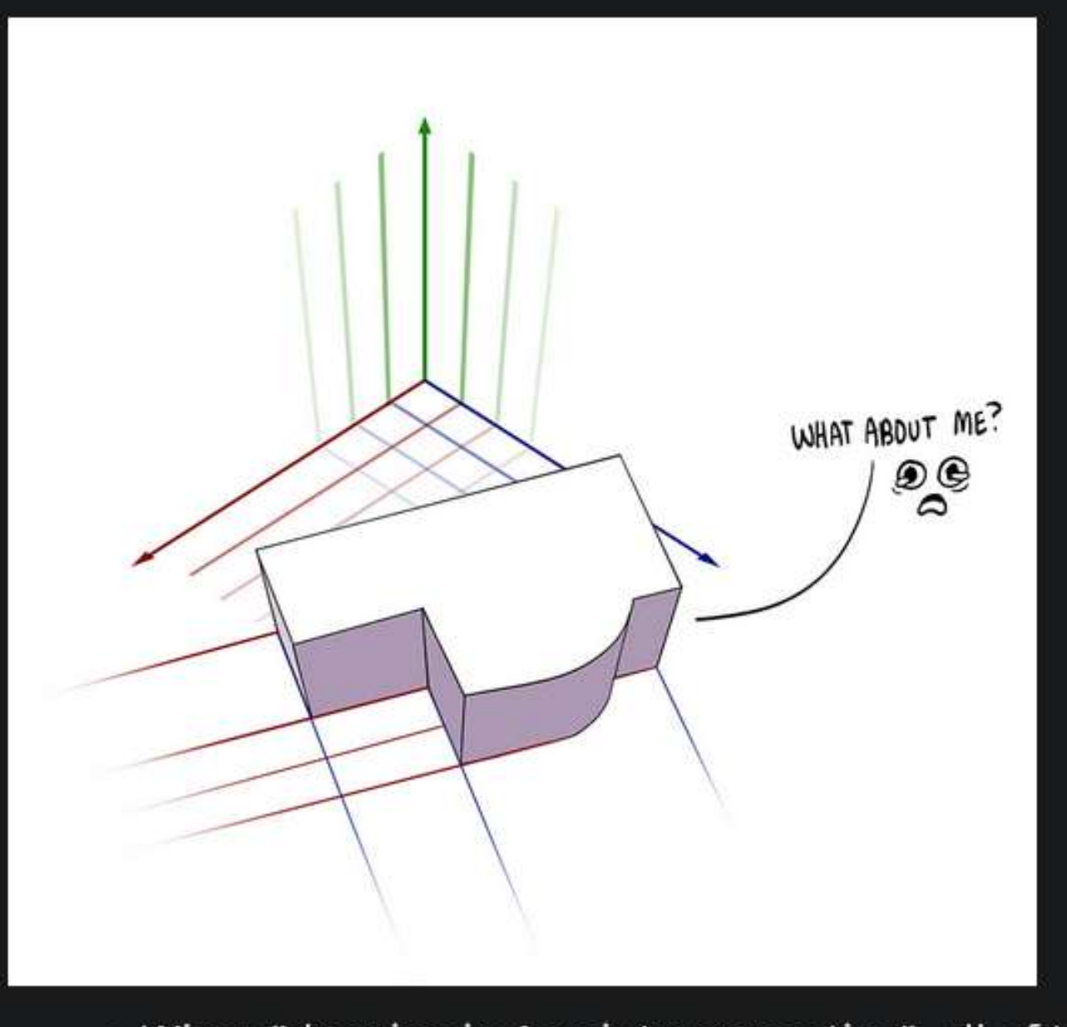

PARALLEL TO THE HORIZON
VP IS NEVER PROJECTED ONTO THE FLAT HORIZON — THUS WE CAN SAY IT IS "AT INFINITY"

As we can see here, we reach an extreme where the right vanishing point can no longer be projected onto the flat horizon line. It ends up running parallel to it, and so they never converge.

This is something that throughout this course, we will refer to as a "**vanishing point at infinity**". There are two critical points to remember in regards to this concept:

- While the lines we draw to represent the edges this vanishing point governs will *not* converge when drawn on a flat page, **we must still think as though the vanishing point exists**. It can be tempting to simply disregard the vanishing point altogether, since the edges it governs can be drawn as lines that are parallel on the page, but this leaves us prone to focusing too much on our drawings as a series of marks on a flat page, and forgetting that we're representing things that exist in three dimensions.
- Whether or not a vanishing point is "at infinity" depends entirely on the orientation of the edges it governs. While it may be tempting at times to do so, **it would be incorrect to force a vanishing point to infinity**. We do not actually control where our vanishing points should fall - rather, we control our intended orientation for a given set of edges, and it is that which determines where the vanishing point will fall, and if that vanishing point will be at infinity.

1, 2, and 3 point perspective


WHAT ABOUT ME?

If you've studied perspective at all in the past, then something you may have come across is the concept of 1, 2, and 3 point perspective. These are an incredibly common approach to explaining perspective - but the road to hell is paved with good intentions, and in my experience (both as a student attempting to learn this stuff, and an instructor trying to teach it) these simplifications do more harm than good, especially to beginners.

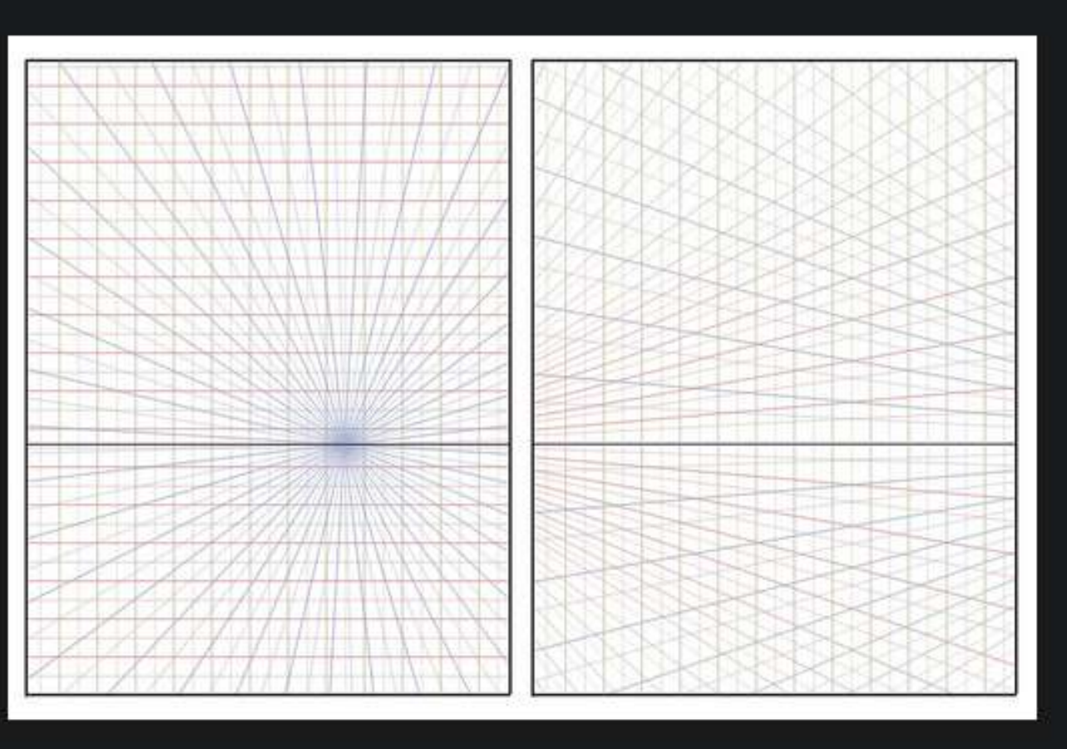
"Point" in this case refers to vanishing points, and it comes about by looking at situations where either one or two vanishing points are at infinity.

- When "drawing in 1 point perspective", all of the horizontals and verticals are drawn parallel on the page - something we now understand to be the result of these edges running perpendicular to the viewer's angle of sight.
- When "drawing in 2 point perspective", all of the verticals are drawn parallel on the page - essentially because all of the objects being drawn are sitting on the ground plane, so their verticals all run perpendicular to it (and to the viewer's angle of sight), resulting in the vanishing point governing them being at infinity.

There are two main problems with this:

- Firstly, it creates the impression that these vanishing points don't just "go to infinity" as we describe it here, but that those vanishing points entirely cease to exist. "1 point perspective" tells us that there is *only* one vanishing point to be concerned with, which can foster a rather misguided understanding of perspective.
- Secondly, it gives us the idea that an entire scene can be represented with just 1, 2, or 3 vanishing points. This would severely limit the complexity of the forms we can include - we'd be limited only to boxes. More than that, it gives students the impression that everything *must* align to one of three very specific orientations. The result is that students would generally stick to an extremely rigid use of perspective, and would never venture into more complex arrangements or forms as shown in the example image.

Perspective grids



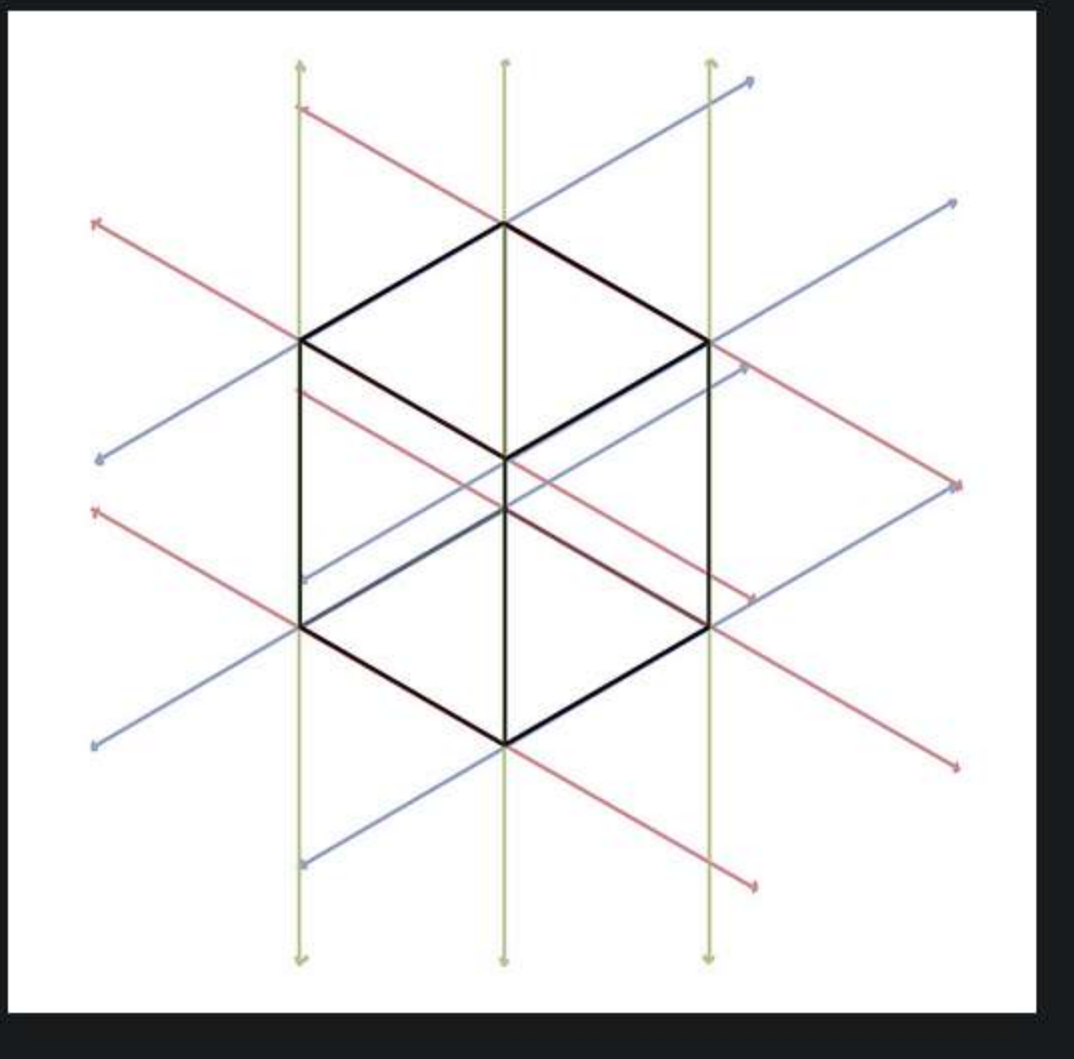
This does not mean that 1, 2, and 3 point perspective are not useful - just that they can be misleading for beginners. Where these kinds of perspective "systems" come in handy is in providing us with simple grids that we can leverage not as rigid guides that we *must* follow, but rather as tools to help us better understand the space in which we're constructing our scenes.

Perspective grids like those in the example image help summarize the 3 major dimensions of 3D space. Which one we choose - whether 1 point (with 2 vanishing points at infinity), 2 point (with 1 vanishing point at infinity) or 3 point (with 0 vanishing points at infinity) - gives us a general sense of how the viewer is oriented relative to the *average* of the objects in the scene.

This can help us lay down our initial forms, either by adhering to that grid (there are cases - like buildings and city streets which adhere fairly closely to grids), or by using those grid lines as references in order to establish edges at other orientations.

So, as with everything - remember that these are *tools*. Tools can be useful things that help us work more efficiently and effectively, but if we use them without thinking and understanding, they can very easily start making choices for us, resulting in drawings that are entirely derivative of the tools we choose to use, rather than uplifted by them.

0 point perspective does not exist



Lastly, remember: **0 point perspective is not a thing**. It does not exist. It's not real. This is most often a matter of a student confusing isometric/axonometric projection with perspective projection. As discussed earlier, these are entirely different strategies for capturing 3D information on a 2D surface, each one having fundamentally different goals.

This course focuses entirely on perspective projection, whose goal is to replicate human binocular vision.

<<< Boxes: Foreshortening and Vanishing Points

Boxes: Simplified Guidelines >>>

WHAT THE HELL AM I SUPPOSED TO DRAW?!..

The Science of Deciding What You Should Draw

Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

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Rules of thumb

In the last page, I explained that 1, 2, and 3 point perspective are simplifications that can when used without proper understanding, have a negative impact on how a student understands the manner in which perspective can be used as a tool. That does not however mean that it is without its uses. Below, I will explain situations where one can simplify the approach to constructing a box, based on how it's oriented in space.

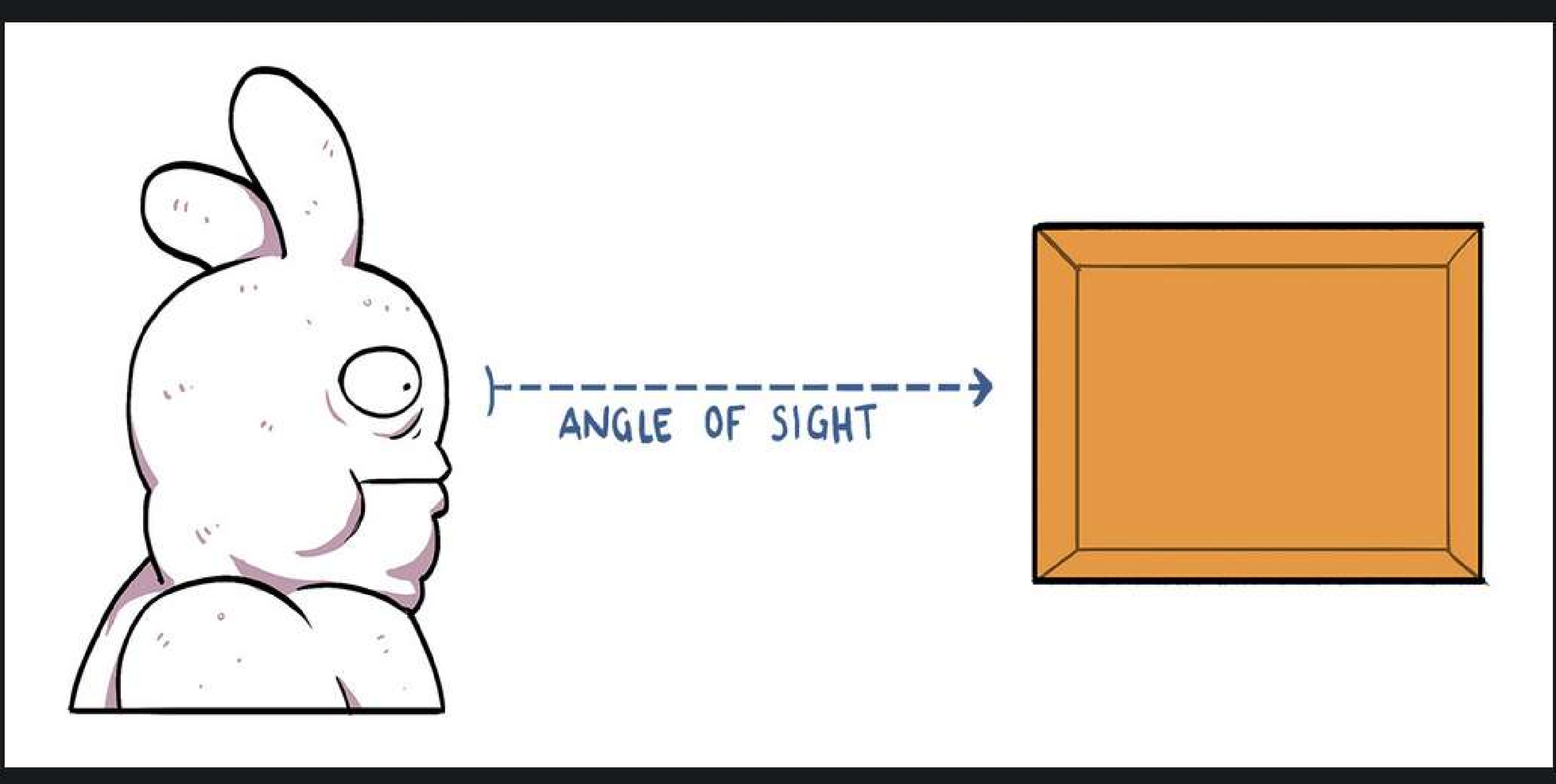
Just keep in mind - these are *loose* guidelines, and depend very much on the circumstances of what you're drawing. Additionally, they only *really* apply to single boxes. That may not seem particularly useful, but you'll be surprised just how often you end up drawing boxes - not as the final goal, but as a tool to help define a chunk of space in which to construct a given object.

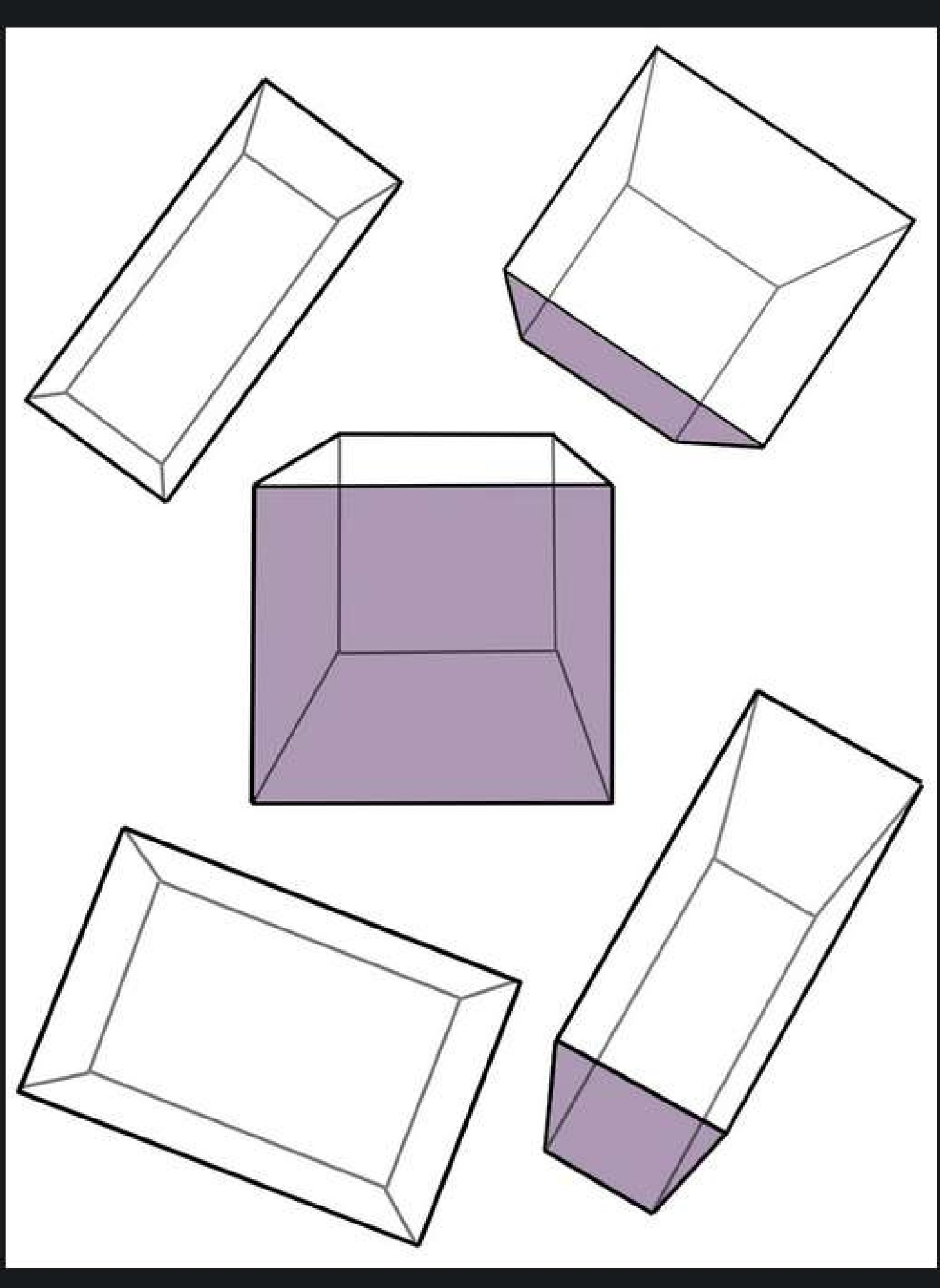
Each of the cases below involve drawing a singular box. The simplified guidelines will help you decide whether this box should be drawn in:

- 1 point perspective (meaning, if the box's orientation is close enough to perpendicular to the viewer on two axes, allowing for 2 vanishing points at infinity)
- 2 point perspective (meaning, if the box's orientation is close enough to perpendicular to the viewer on one axis, allowing for 1 vanishing point at infinity)
- or 3 point perspective (meaning, the box's orientation would not allow for any of the vanishing points to be at infinity)

In doing so, each one will have you consider the general silhouette of the box you wish to draw - that is, the 2D shape it will result in when drawn on the page.

These guidelines are suggestions for you to use *outside* of this course. Do not employ them for any of the exercises you're doing here - especially not ones like the box challenge and cylinder challenge, which have us drawing forms that are randomly rotated in space.

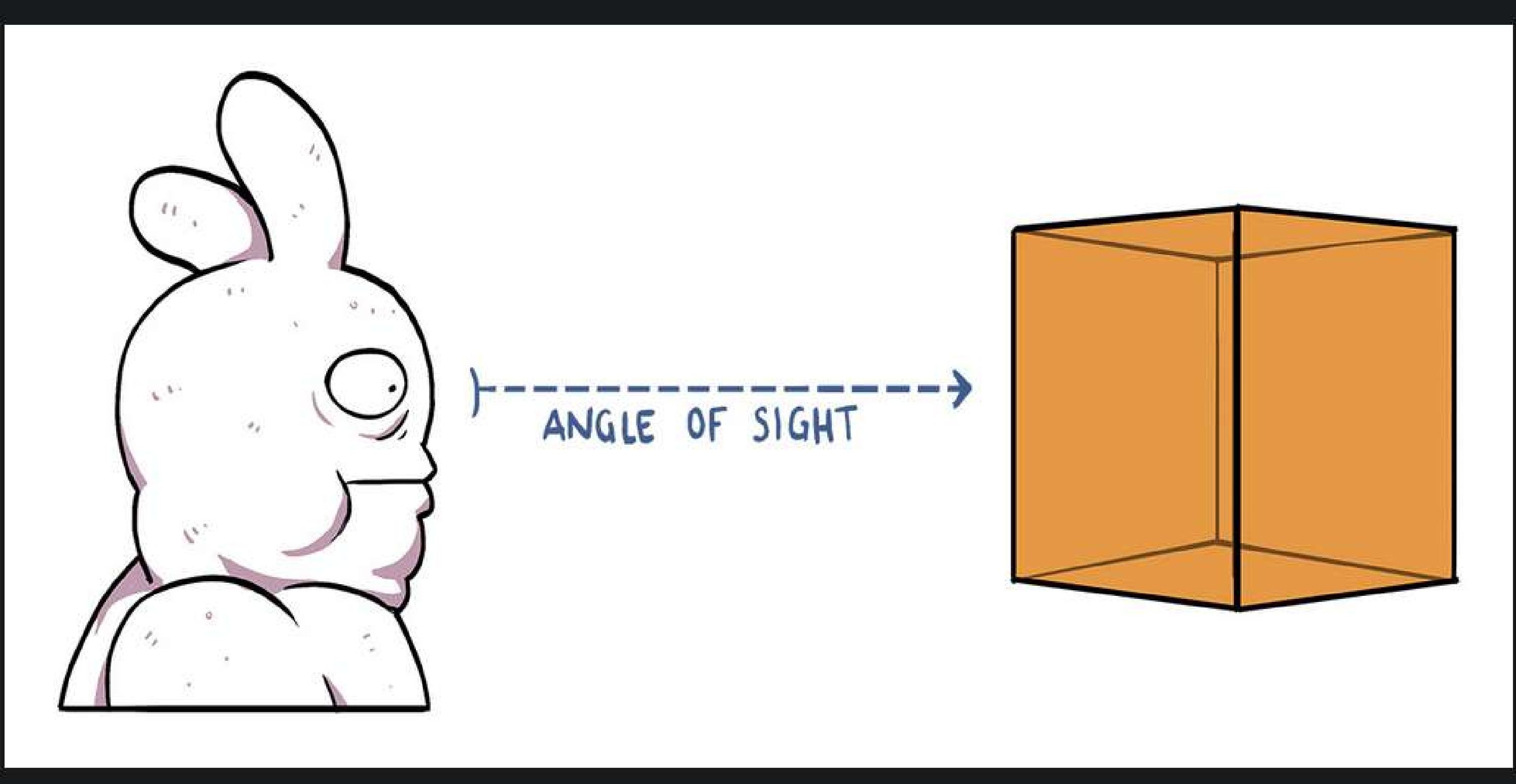


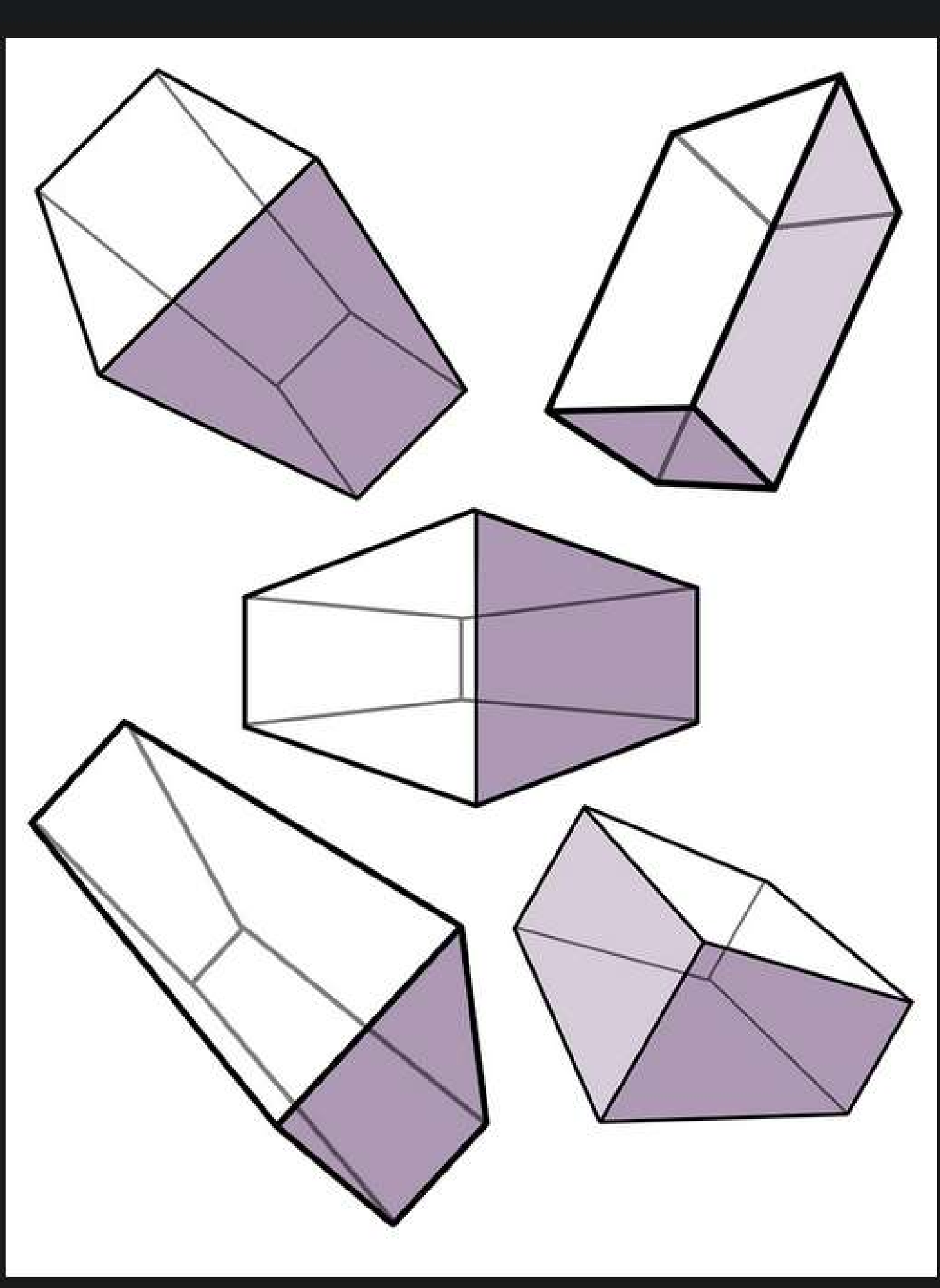


1 point perspective simplified

Consider the box you wish to draw, and the general silhouette its orientation will result in when drawn on the page. If the center of this silhouette is roughly over one of the box's faces (and is not too close to an edge or corner), then you can likely get away with drawing this box in 1 point perspective. This means that one vanishing point will be inside of or very close to the box's silhouette, but the other two can be placed at infinity, allowing you to draw those edges as parallel on the page.

The closer the silhouette's center drifts to an edge or corner, the more "off" this will end up appearing, so do not try to force it.

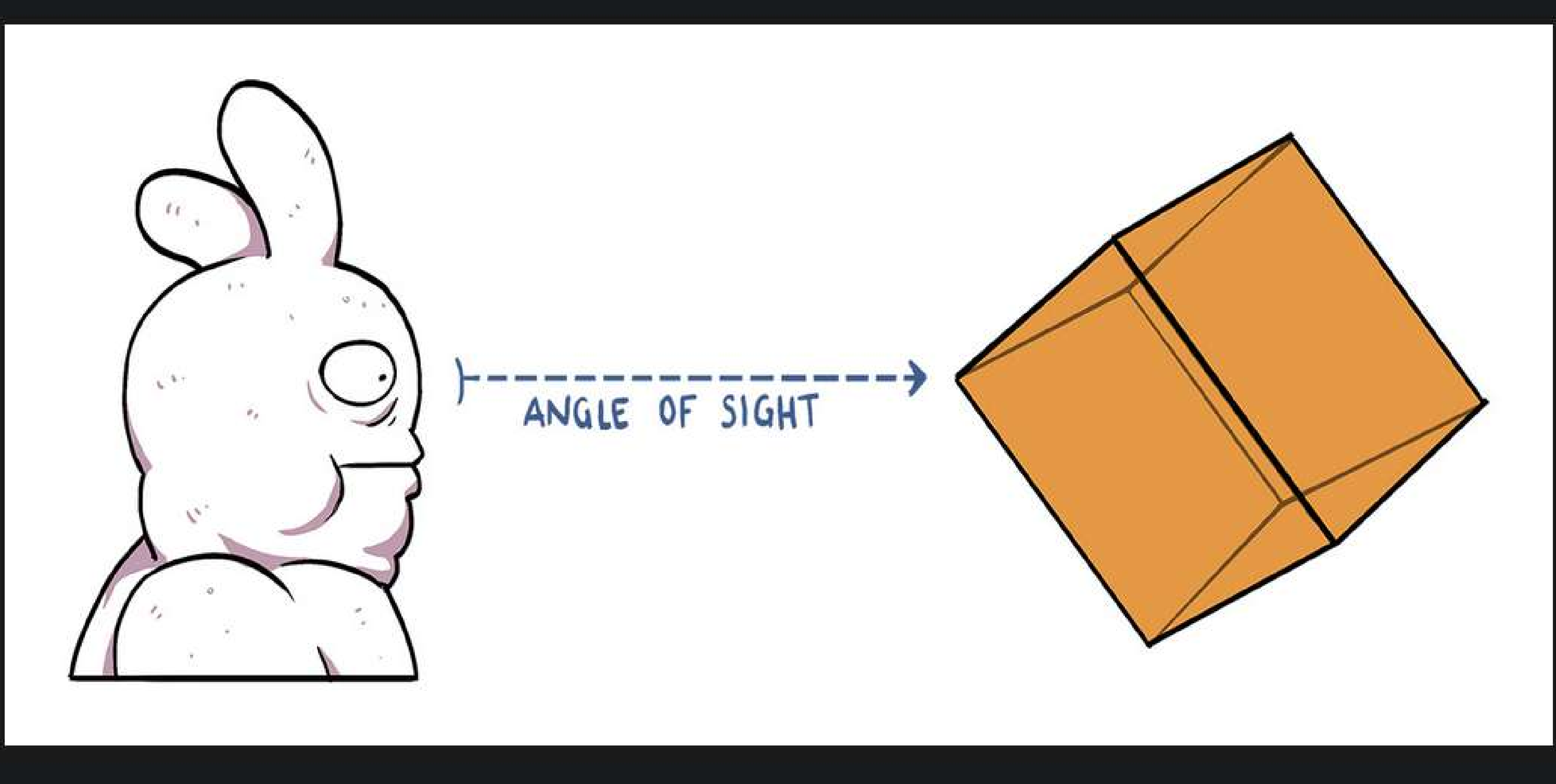


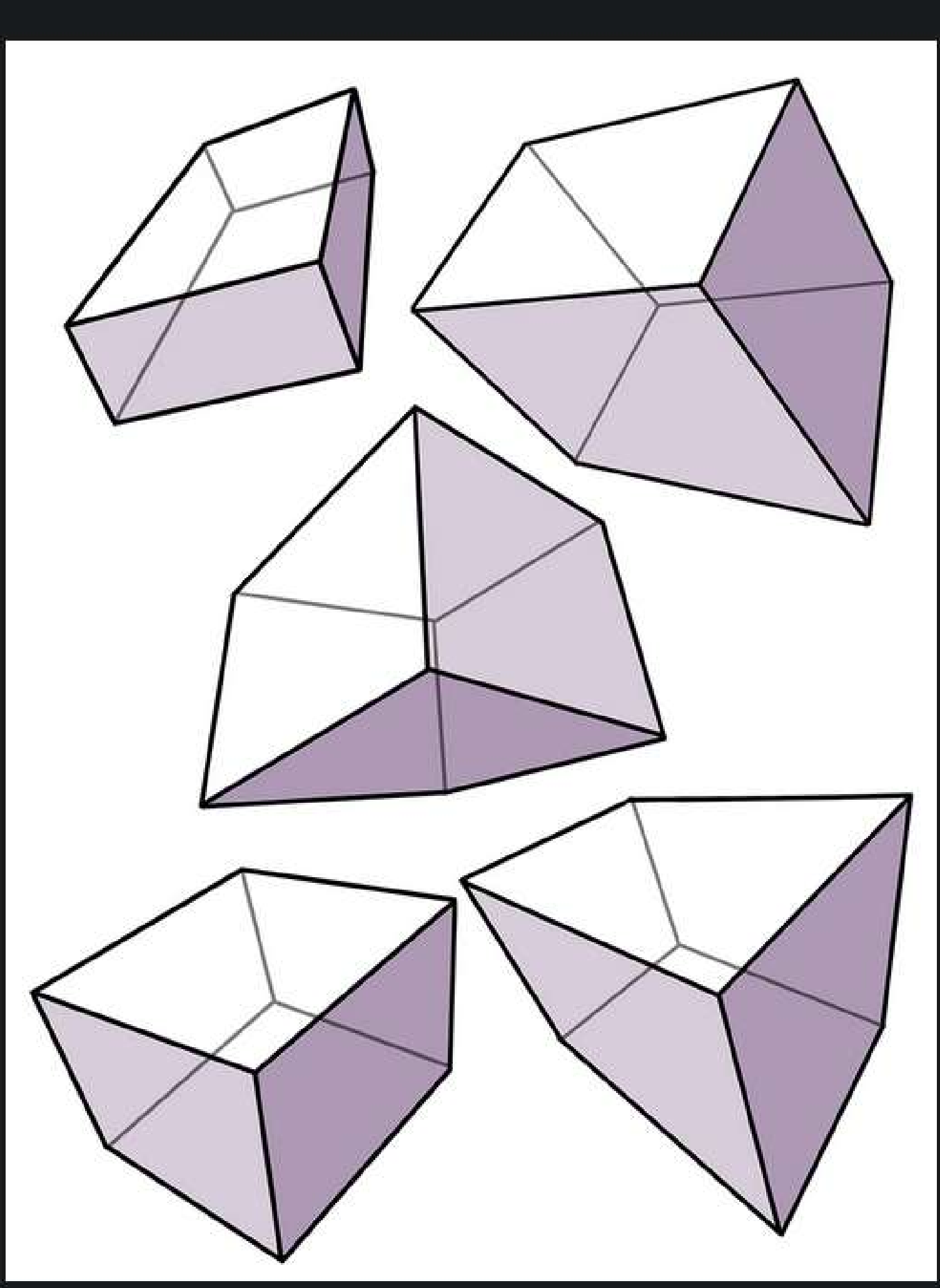


2 point perspective simplified

If the general silhouette of your box once drawn is centered close to an edge, you can get away with drawing it in 2 point perspective - meaning, with two sets of parallel edges drawn as lines that converge towards concrete vanishing points, and one set of parallel edges whose vanishing point is at infinity, allowing them to be drawn as parallel on the page.

The closer the silhouette's center drifts to a corner, the more it'll start to look distorted.





3 point perspective simplified

And lastly, if you find that the box's silhouette is centered close to one of the box's corners, then there's not much that can be done. Attempting to force any of the vanishing points to infinity will result in a ton of distortion, so that should absolutely be avoided in these situations.

<<< Boxes: Rotation, Perspective Grids, and the Concept of Infinity   Boxes: Additional Notes >>>

Sakura Pigma Microns

A lot of my students use these. The last time I used them was when I was in high school, and at the time I felt that they dried out pretty quickly, though I may have simply been mishandling them. As with all pens, make sure you're capping them when they're not in use, and try not to apply too much pressure. You really only need to be touching the page, not mashing your pen into it.

In terms of line weight, the sizes are pretty weird. 08 corresponds to 0.5mm, which is what I recommend for the drawabox lessons, whereas 05 corresponds to 0.45mm, which is pretty close and can also be used.

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What Next?

Lesson 1: Lines, Ellipses and Boxes

Boxes: Additional Notes

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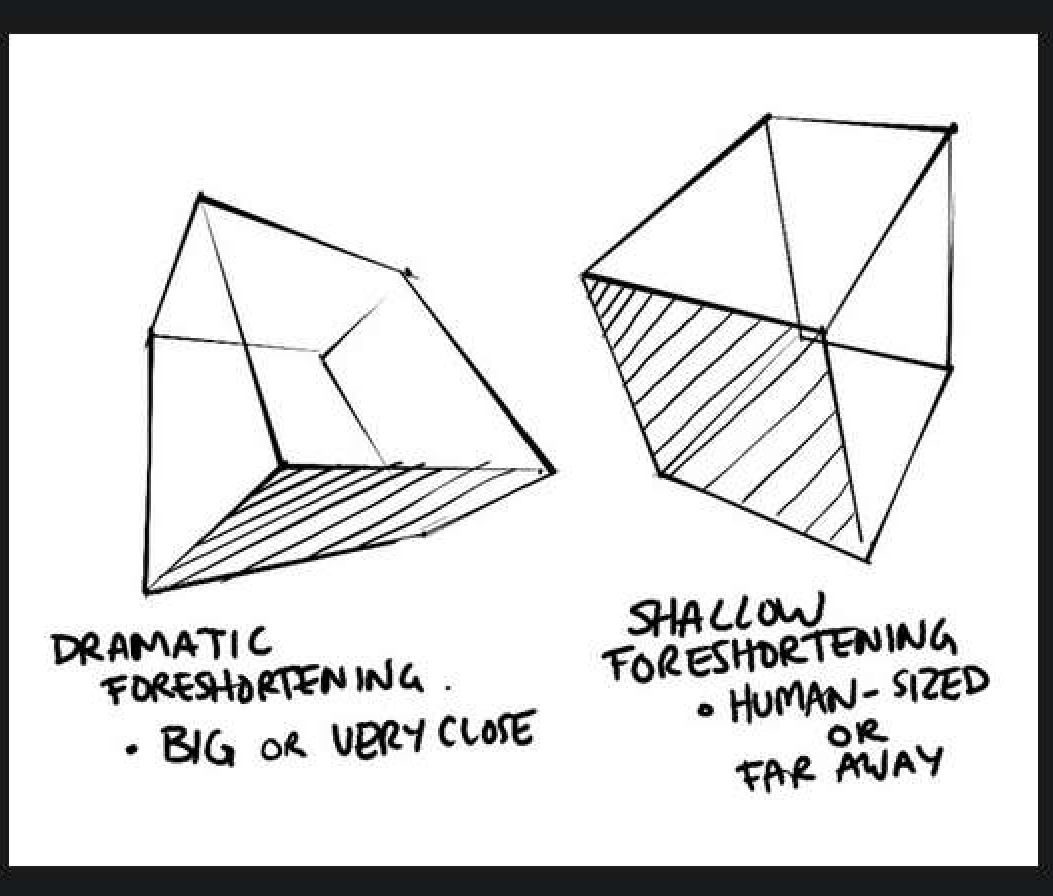
Initially I included these points as part of the Boxes page, but decided to separate them out on account of them not being *that* important in the context of what I'm trying to teach. They are good to know, but where the lesson material for boxes is already way too much to absorb, this stuff just doesn't seem as critical, and it's probably best to keep these ridiculously lengthy pages as short as possible so as to keep students from getting overwhelmed.

Foreshortening



Foreshortening is the rate at which an object gets smaller relative to its distance from the viewer. Using a box as an example, if the far end of the box is considerably smaller than the end nearest to the viewer, then it's got a lot of foreshortening applied to it (often described as being more dramatic foreshortening).

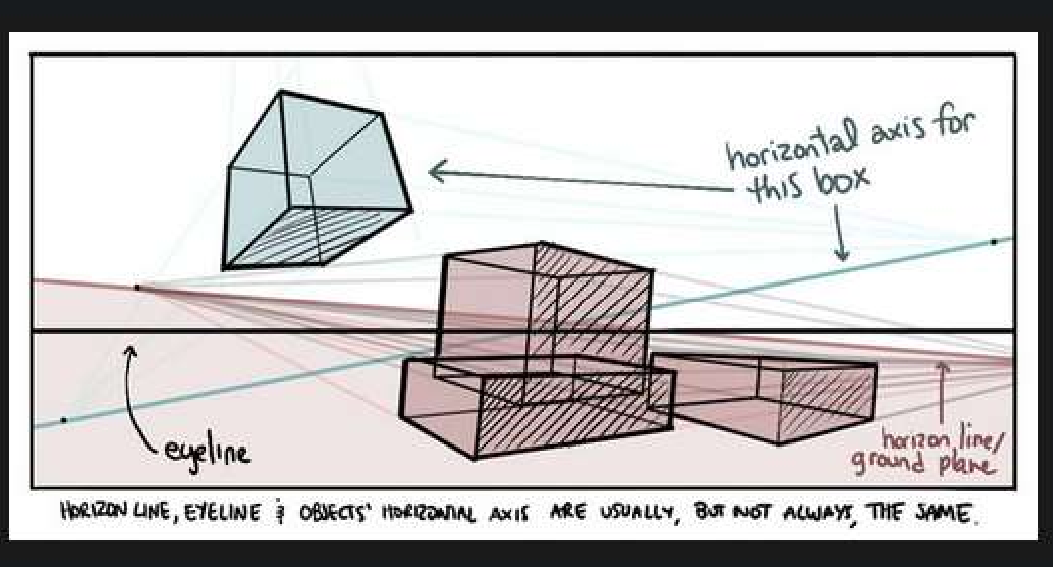
If both ends of the box are close to the same size, with the far end only being slightly smaller, then it's considered to have very little foreshortening, or 'shallow' foreshortening.

The foreshortening of an object tells us certain things about it. If an object has really dramatic foreshortening, it's usually either VERY large (like when you look at the top of a tall building from the ground, there's a visible size difference in the base and the top), or it's extremely close to your eye. If it has shallower foreshortening, it's going to either be smaller, a more relatable human scale, or very far away.

It is important that you keep this consistent in your scene. That is, if you have two objects that are meant to be the same size, it isn't necessarily enough just to have the closer one be bigger and the farther one be smaller. If you have the farther one have more dramatic foreshortening, that's going to immediately be glaringly inconsistent, and your viewer is going to have trouble making sense of it. For that reason, I use more dramatic foreshortening quite sparingly.

It's also worth considering what is going to read as being the same size. If you have a bunch of boxes in your scene and nothing else (like the organic perspective exercise), then those boxes will automatically read as being the same size whether you mean for them to or not, because that's what the brain expects. As such, having inconsistent foreshortening there is going to throw things off, even if you mean for certain boxes farther away to be absurdly large.

Horizon line, eye line, axis



HORIZON LINE, EYELINE & OBJECTS' HORIZONTAL AXIS ARE USUALLY, BUT NOT ALWAYS, THE SAME.

You've probably heard about the horizon line, which establishes the ground plane in the scene. You can also *usually* think of it as the "eye line", as it is the line that represents where your eyes are relative to the scene you're looking at. If it's very high, then your eyes (and therefore you) are high up, with the bulk of your scene unfolding beneath your altitude. If it's very low in the frame, your eyes are closer to the ground, as everything unfolds higher up.

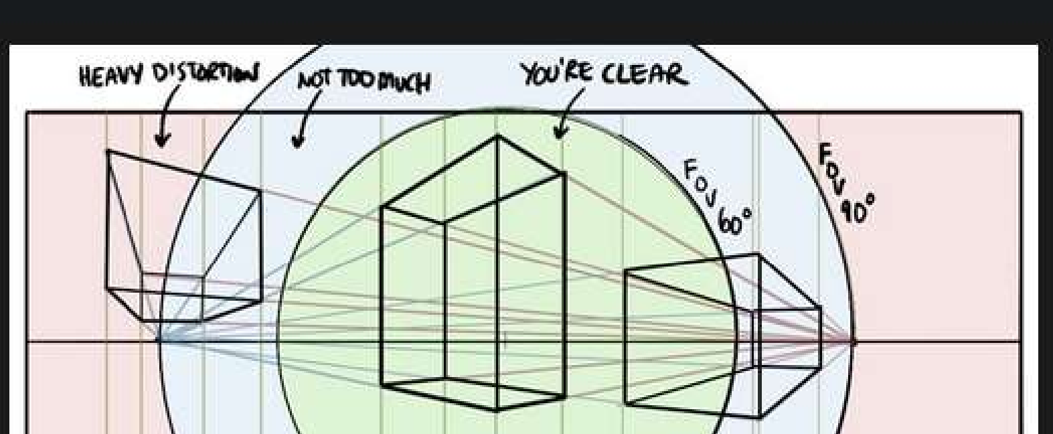
When drawing a box, *if that box is sitting on the ground*, and therefore parallel to your vision (so your head is straight and so is the box), two of its vanishing points are going to sit on the horizon line. The second you tilt your head (sometimes referred to as a 'Dutch angle' or a 'Dutch tilt' in cinematography), your eye line is going to tilt along with it, but the box's vanishing points will not follow.

As such, you can think of there being a number of different important lines that will *usually* but not always be represented by the same line.

- Your (the viewer's) eyeline, a line which passes through both of your eyes and tilts whenever your head does
- The horizon line (which defines the ground plane)
- The horizontal axis of an object, in this case a box, on which its horizontal vanishing points sit. When the box is set at an angle, this line tilts correspondingly

To repeat: the eye line, horizon line and object's horizontal axis will frequently be the same, but not always.

Distortion



It is important to realize that there's some flexibility to all of this. With two point perspective, you can't be looking at the box from too high or too low of an angle - but you have a bit of wiggle room as to what constitutes "too high" or "too low". Same goes for one point perspective, where close enough to looking straight at one of the faces of the box will still work.

When you start pushing the boundaries of these "flexible limits", you start to get more and more distortion in your drawing. This is where things can get a little wacky, and where a drawing can start to feel wrong even though you're following all of your vanishing points correctly.

A common place we see this is when we're drawing a box in 2 point perspective, and part of the box falls outside of the space between the two vanishing points on the horizon. Here you're going to start seeing a lot of distortion very quickly.

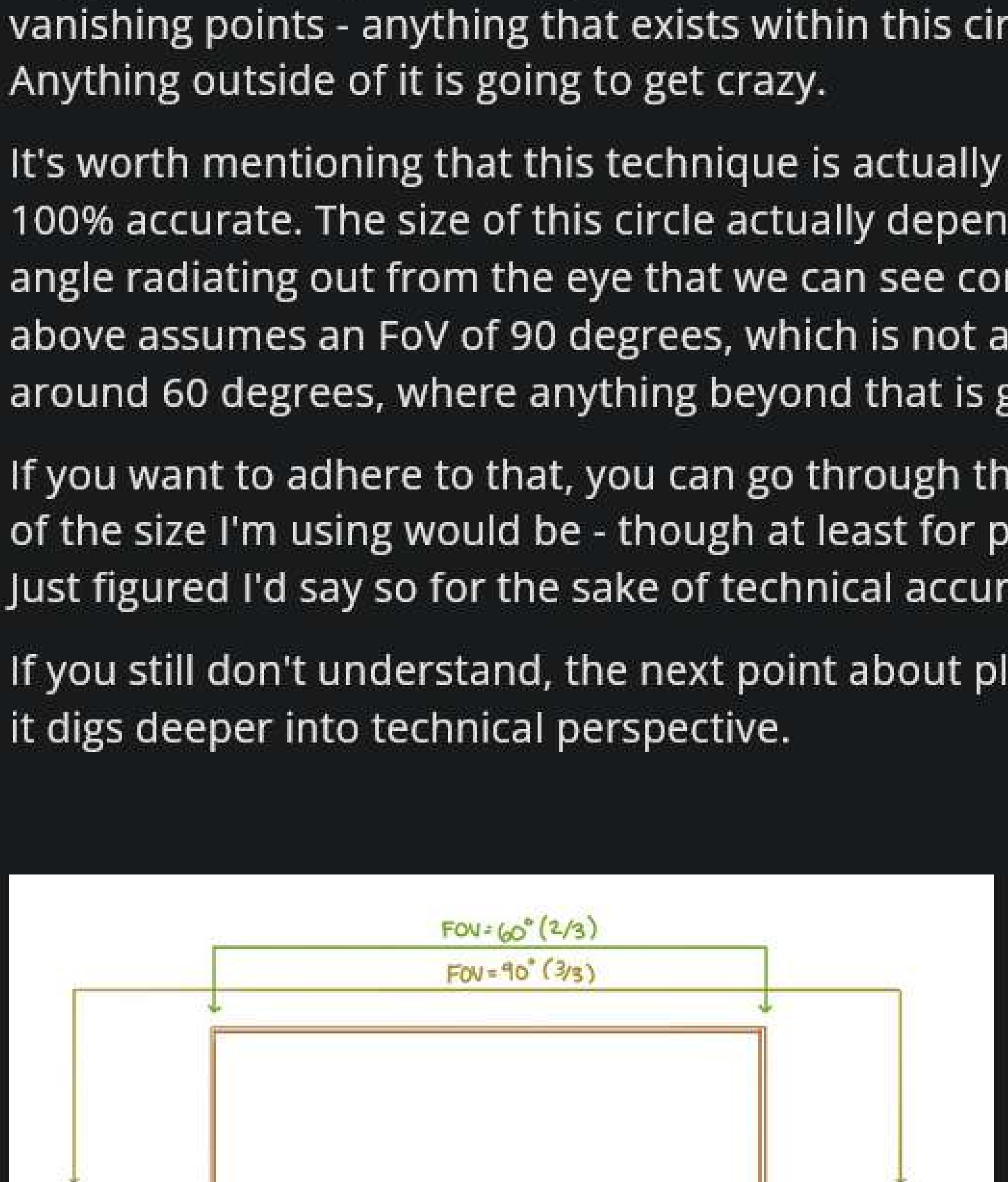
The trick I use to avoid that is to, first off, keep everything between the vanishing points - but this also happens vertically as well. So, you can imagine there being a circle that passes through both vanishing points - anything that exists within this circle should be *reasonably* free of distortion. Anything outside of it is going to get crazy.

It's worth mentioning that this technique is actually a simplification, and while entirely workable, not 100% accurate. The size of this circle actually depends on the *field of view* of your eyes, which is the angle radiating out from the eye that we can see comfortably at a glance. The technique I describe above assumes an FoV of 90 degrees, which is not actually true to humans. We're more comfortably around 60 degrees, where anything beyond that is going into our peripheral vision.

If you want to adhere to that, you can go through the trouble of figuring out where a circle two-thirds of the size I'm using would be - though at least for practice and exercises I wouldn't bother with it. Just figured I'd say so for the sake of technical accuracy.

If you still don't understand, the next point about placing vanishing points *may* help - but be warned, it digs deeper into technical perspective.

Placing vanishing points



This is one of the few technical perspective diagrams you're going to see from me, but there is value in at least understanding the concepts, specifically to learn how far apart your vanishing points should be.

This diagram has a lot going on, so we'll break it down bit by bit.

At the bottom, we have the station point. This is a somewhat abstract location - it doesn't actually represent a physical location in the world of your drawing, but it relates to the position from which the viewer is seeing the scene. We can find this point by drawing lines out from each vanishing point at a 45 degree angle to the horizon. They will meet at the station point, with a 90 degree angle (a right angle) between them.

The rectangle in orange is the picture plane. Currently we have it centered between the vanishing points, but it doesn't have to be - it can slide along the horizon line. Our actual drawing exists within this rectangle, you can actually picture it as the manifestation of your piece of paper - the window we use to look out into this world.

If the picture plane were wide enough to be touching both vanishing points (the width defined by the yellow lines marked FOV = 90°) we would be looking at the scene with a field of view of 90 degrees. What this basically means is the viewer would be able to see a full 90 degree arc in front of them, and it would all be packed into the picture plane. This corresponds to the 90 degrees at the station point (in red).

Now, as discussed in the previous section about distortion, the human eye is limited to an FOV of about 60°, so the picture plane containing a 90° arc of vision is going to result in some heavy distortion where all this information is being crammed into a smaller space than it should.

Therefore we draw our picture plane to be about two-thirds (2/3) of the distance between the left and right VPs. Again - the picture plane doesn't need to be centered between them, we're just talking about its width relative to the distance between these two vanishing points.

One last thing worth mentioning - each of the two vanishing points govern a set of parallel lines. A requirement for this whole setup is that the lines governed by each vanishing point **must be perpendicular to each other**. Meaning, the lines going to the left vanishing point are perpendicular to the lines going to the right vanishing point. These are not two arbitrary VPs.

This is what is illustrated with the two instances of "90° in 3D space" in the middle of the picture plane.

<<< Boxes: Simplified Guidelines
Boxes: Homework >>>

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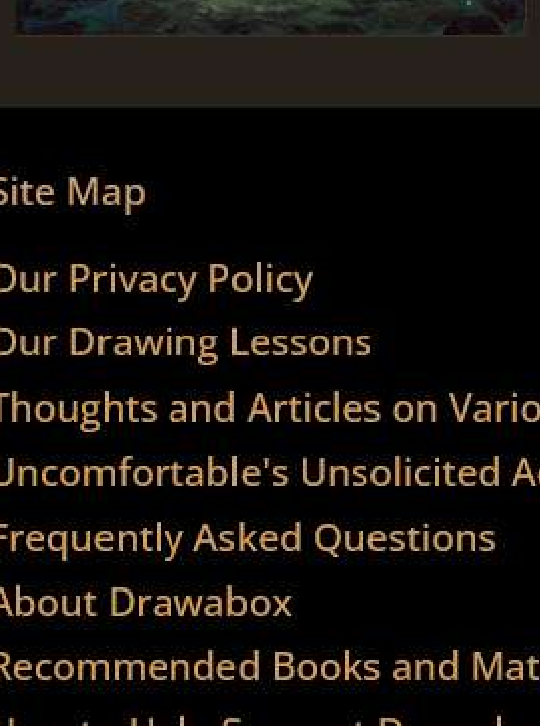

The Art of Brom

Here we're getting into the subjective - Gerald Brom is one of my favourite artists (and a pretty fantastic novelist!). That said, if I recommended art books just for the beautiful images contained therein, my list of recommendations would be miles long.

The reason this book is close to my heart is because of its introduction, where Brom goes explains in detail just how he went from being an army brat to one of the most highly respected dark fantasy artists in the world today. I believe that one's work is flavoured by their life's experiences, and discovering the roots from which other artists hail can help give one perspective on their own beginnings, and perhaps their eventual destination as well.

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Boxes: Homework

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Homework and exercises

Every Drawabox lesson consists of lecture content and exercises that are assigned as homework. It's best to complete this homework before moving onto the next section. As this lesson consists of three sections (lines, ellipses, boxes), it is best that you **only submit your work for review when you've completed all three**.

The homework assignment for this section is as follows:

- 1 filled page of the Plotted Perspective exercise. One page should contain three frames as shown in the exercise example.
- 2 filled pages of the Rough Perspective exercise. Each page should contain three frames as shown in the exercise example.
- 1 filled page of the Rotated Boxes exercise
- 2 filled pages of the Organic Perspective exercise

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here. In a pinch, I will accept work done in ballpoint, but only if the situation is dire. This is an exception only for this lesson as students get started.

<<< Boxes: Additional Notes

What Next? >>>

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Faber Castell PITT Artist Pens

Like the Staedtlers, these also come in a set of multiple weights - the ones we use are F. One useful thing in these sets however (if you can't find the pens individually) is that some of the sets come with a brush pen (the B size). These can be helpful in filling out big black areas.

Still, I'd recommend buying these in person if you can, at a proper art supply store. They'll generally let you buy them individually, and also test them out beforehand to weed out any duds.

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Lesson 1: Lines, Ellipses and Boxes

Plotted Perspective

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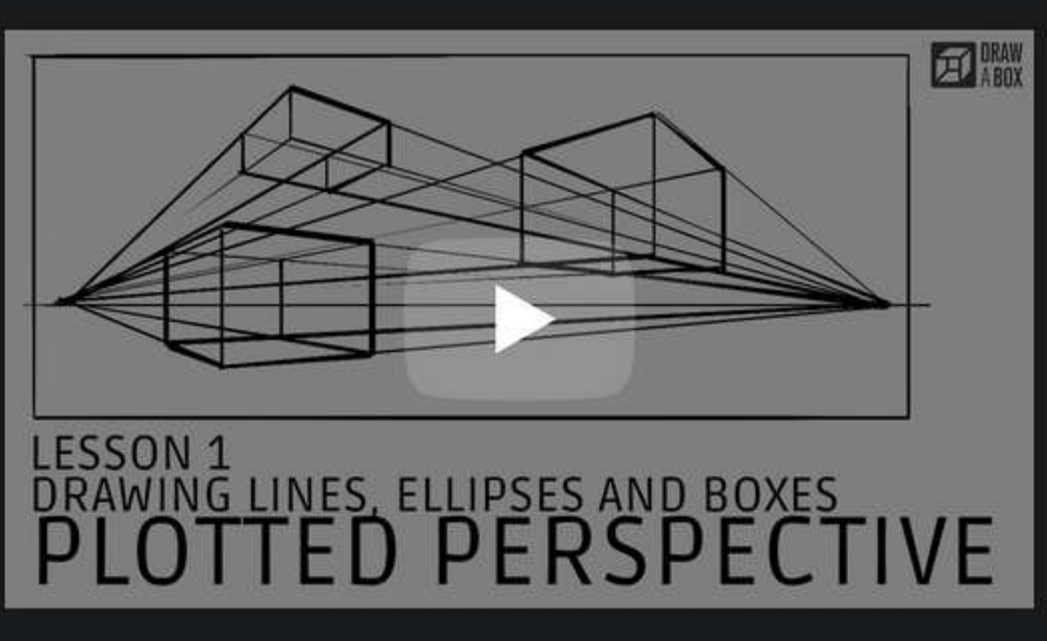
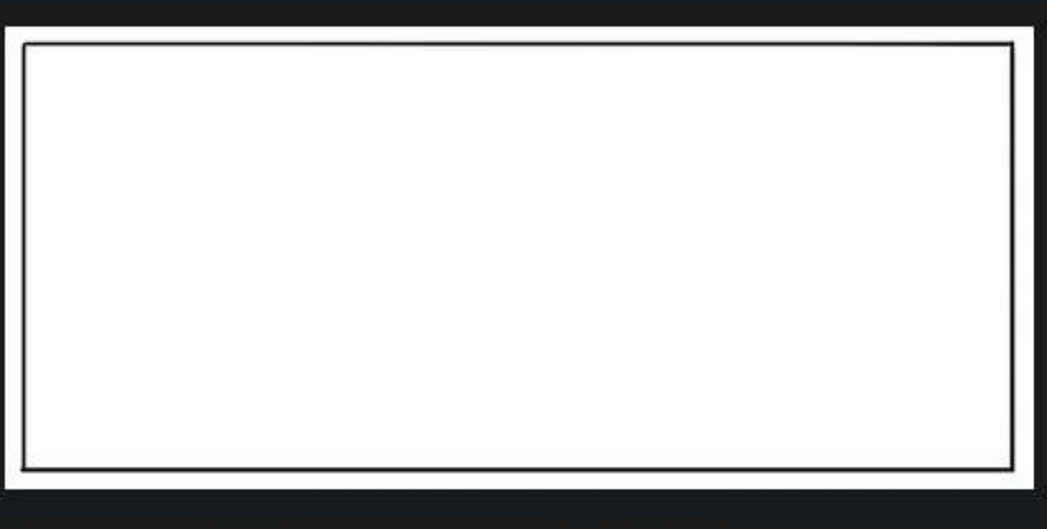
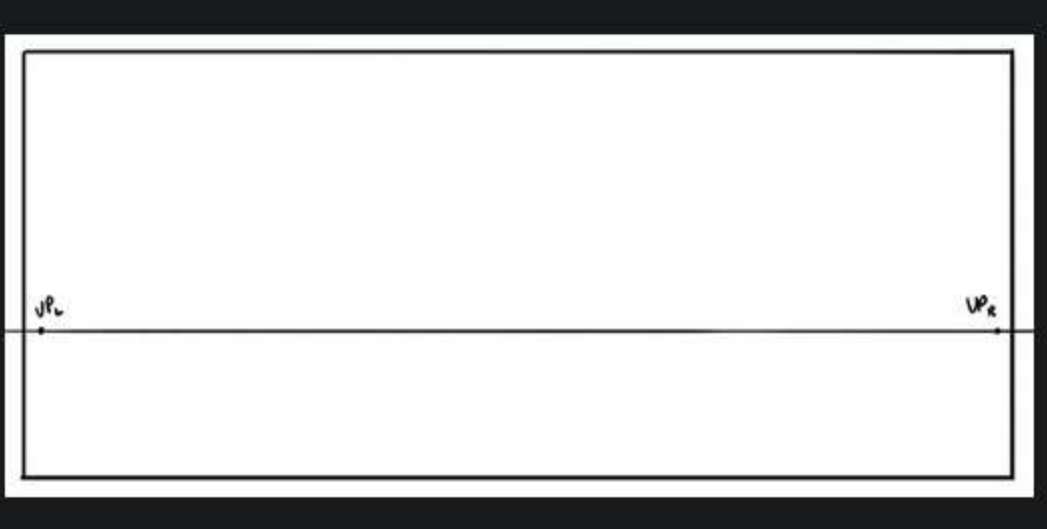


In this exercise, we're just going to get used to the concept of a vanishing point and plotting lines back to them to create boxes. We'll be drawing in 2 point perspective, and **we'll be doing everything in this exercise with a ruler**.

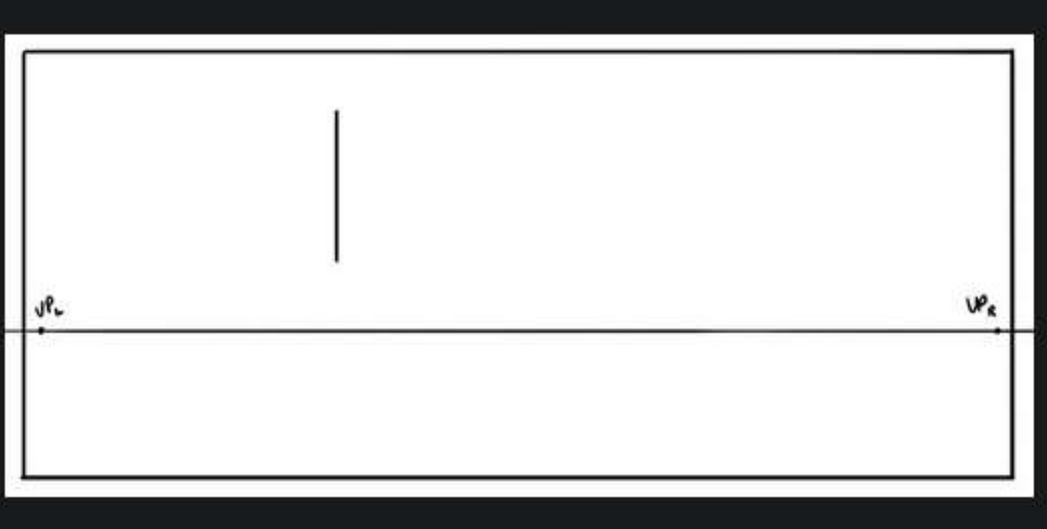
This process has a lot of steps, but each step is quite simple. Follow the instructions exactly as they're written, and you'll do fine.



Start by drawing a frame on your page - this is going to define the picture plane for our scene. You can think of this frame as being a window into a larger 3D world. Since we'll do this exercise several times on a page, make sure you arrange it so you can fit two or three of these on the page, and make sure they're rectangular, wider than they are tall.

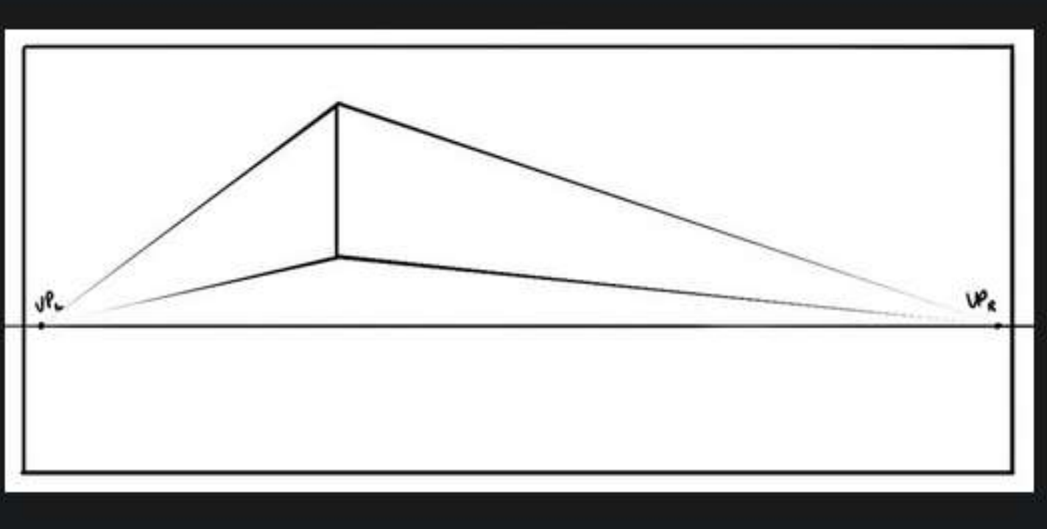


Lay out your horizon line, and place your vanishing points on either side of it. You can actually place these vanishing points outside of the frame if you wish, but that's not necessary. Just make sure there's a lot of room between them, as you'll be working in the space in between.



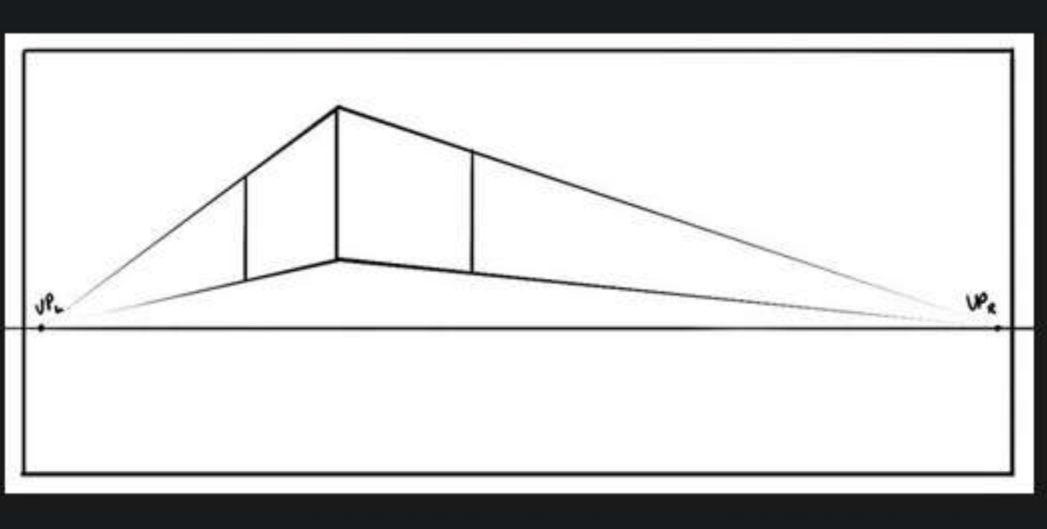
We're going to be using 2 point perspective for all of these boxes. (REMEMBER: the fact that we're using the same vanishing points for all the boxes in this scene is not natural, and is only for the purposes of this exercise), as described in the "simplified" explanation at the end of the boxes lesson page. The viewer will be oriented towards a vertical edge of each of these boxes.

So, we're going to start drawing our first box by drawing a vertical line. Vertical lines in 2 point perspective run perpendicular to the horizon. Since our horizon is perfectly horizontal, then our line can be perfectly vertical, running up and down. The size doesn't matter, but don't go making it too big. This will establish the height of our resulting box.



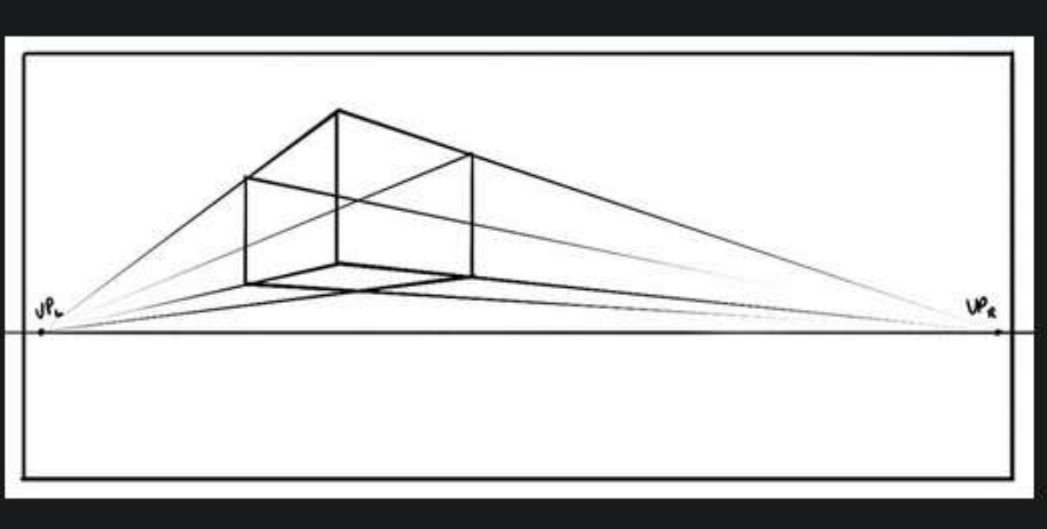
Now draw a line back from each end of that vertical line back to each vanishing point. You'll be drawing four lines:

- One from the top of the line to the left vanishing point
- One from the top of the line to the right vanishing point
- One from the bottom of the line to the left vanishing point
- One from the bottom of the line to the right vanishing point

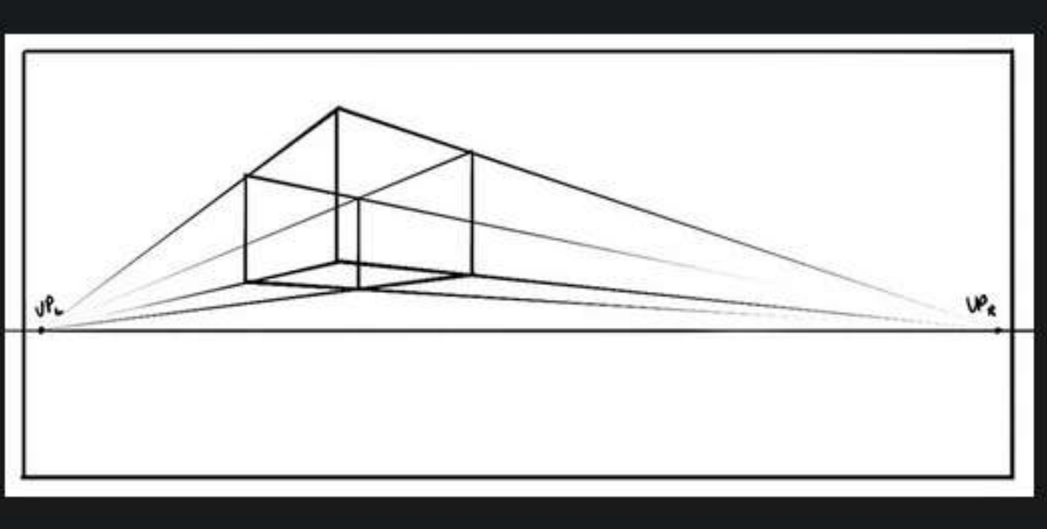


Now we're going to establish the width and depth of this box. We are NOT constructing a perfect cube, just an arbitrary box.

On the left side, you've got two lines going towards the left vanishing point. In the space between those two, draw a single vertical line. Then do the same on the right side, between those going towards the right vanishing point.



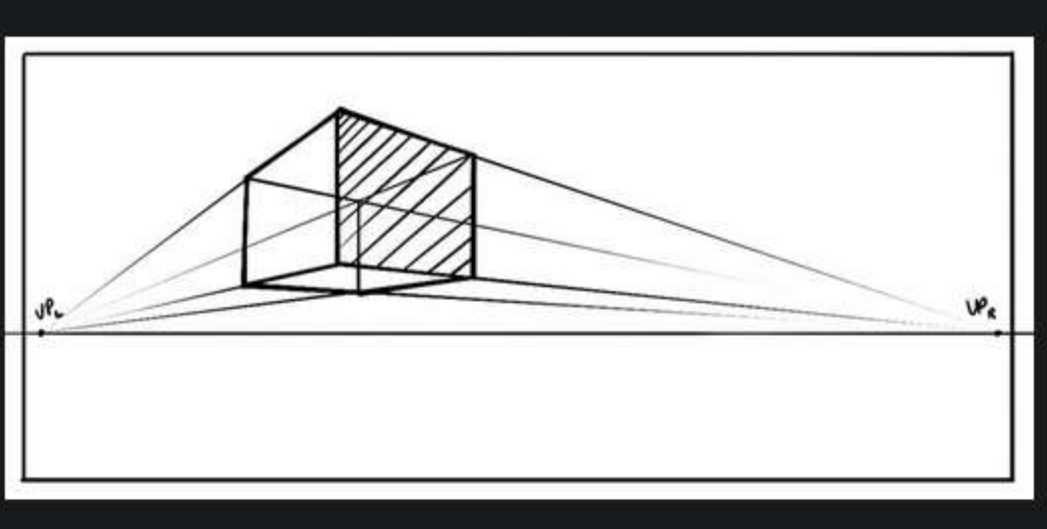
For each of these two new vertical lines, draw lines going from their tops and bottoms back to the other vanishing point - meaning, you'll be drawing 4 new lines, 2 to each vanishing point.



All that's left to do now is to draw the back vertical edge of your box. It can sometimes be a little tricky to see, but the two back corners of your box should already be defined where some of the lines you've drawn to your vanishing points intersect. Find those corners and draw your last vertical line between them.

I'll warn you now: **This may not work perfectly**. This kind of construction for boxes works assuming that every single step has been followed perfectly, without any human error. Every time you miss a vanishing point by so much as a millimeter, you throw things off by a little bit, and it accumulates.

That's totally okay, and if you look at any of my demonstrations, you'll see places where this back edge doesn't align quite right - but it's very close. There's really nothing to worry about there.



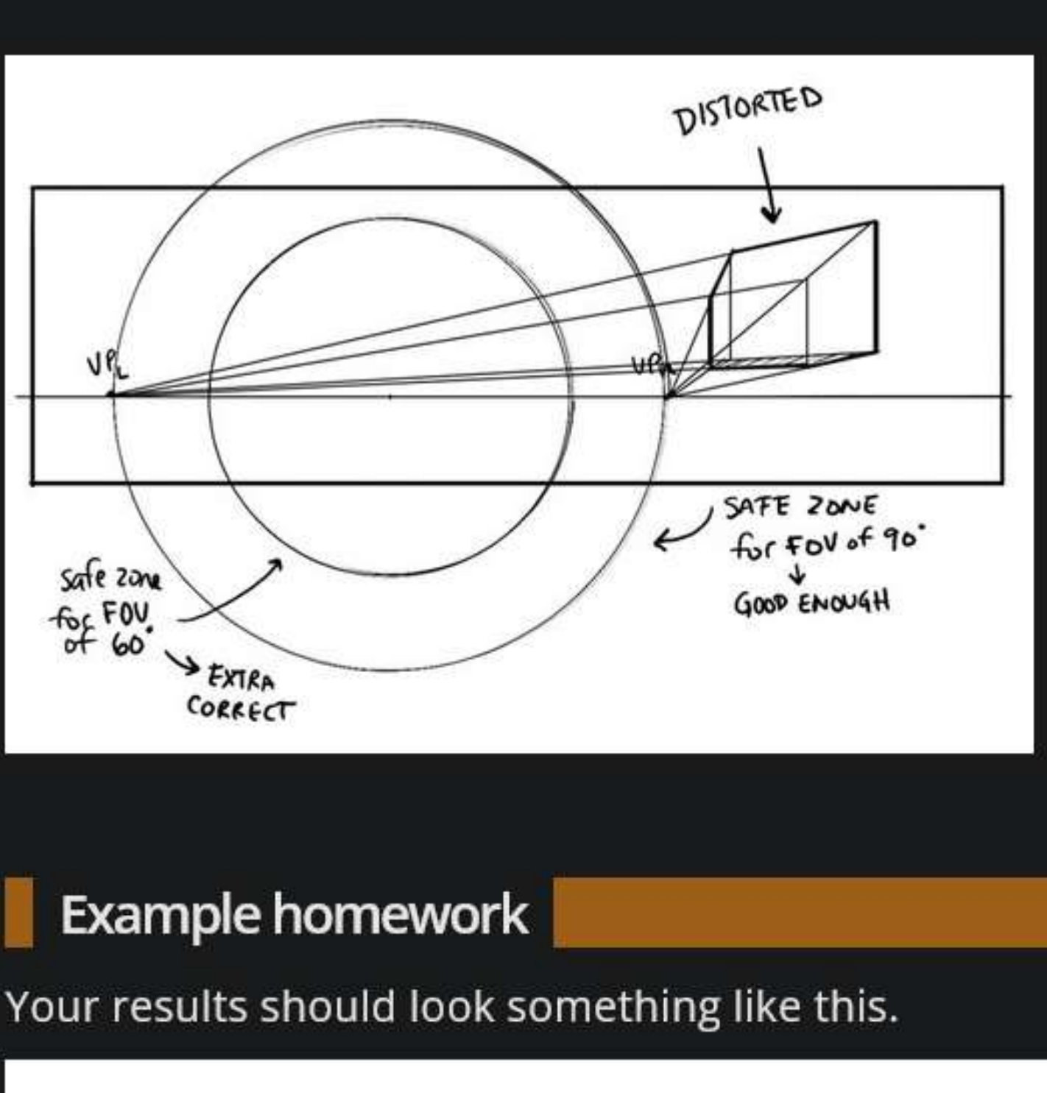
Lastly, you can add a little extra weight to the lines of the actual box by going over them with an additional pass. Do this with your same pen, and as with all of this exercise, use your ruler or straight edge.

You can put the most line weight/thickness on the lines defining the silhouette, a little less on the internal lines that point towards the viewer, and still less on the lines that'll sit on the opposite side of the form.

You can also choose one of the front-facing faces of the box and fill it with some tight, parallel, consistent hatching lines that stretch all the way across the plane from edge to edge. Don't rush this or do it sloppily - it's optional, so if you decide to do it, make sure it's neat and tidy.

The purpose of this exercise

This exercise is really only geared at familiarizing those who are starting out with the concept of a vanishing point, and how we can plot lines that are parallel in 3D space back to their shared vanishing points.

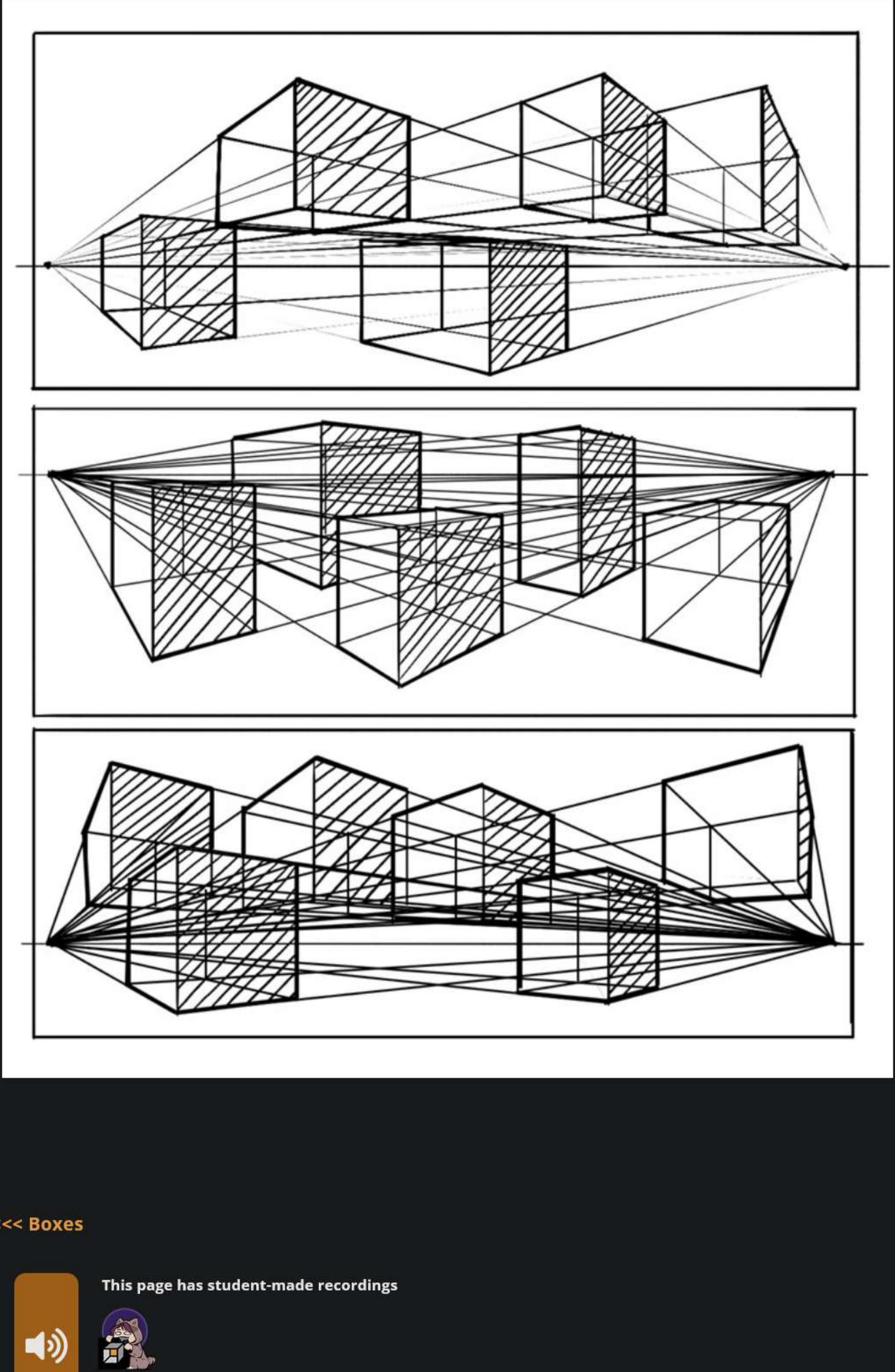


Mistake: Distortion

Sometimes students will accidentally draw their boxes so they sit - either entirely or partially - outside of the space between the two vanishing points. This can also happen if the boxes are placed too high above. I explain why this is happening in these notes on distortion and field of view.

Example homework

Your results should look something like this.



<<< Boxes

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Pentel Pocket Brush Pen

This is a remarkable little pen. Technically speaking, any brush pen of reasonable quality will do, but I'm especially fond of this one. It's incredibly difficult to draw with (especially at first) due to how much your stroke varies based on how much pressure you apply, and how you use it - but at the same time despite this frustration, it's also incredibly fun.

Moreover, due to the challenge of its use, it teaches you a lot about the nuances of one's stroke. These are the kinds of skills that one can carry over to standard felt tip pens, as well as to digital media. Really great for doodling and just enjoying yourself.

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What Next?

Lesson 1: Lines, Ellipses and Boxes

Rough Perspective

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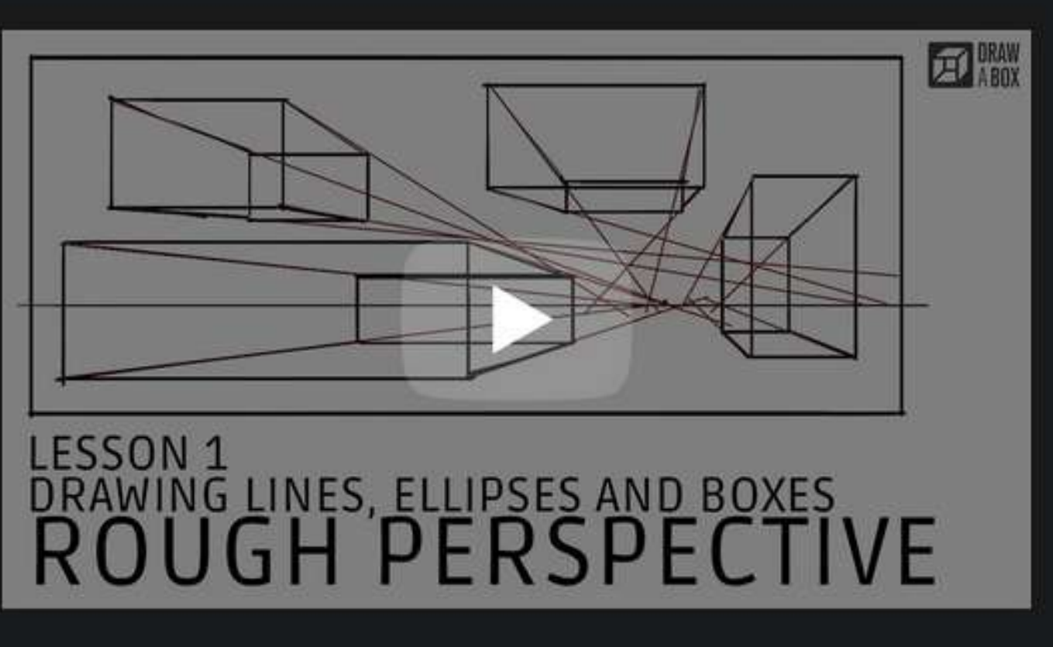
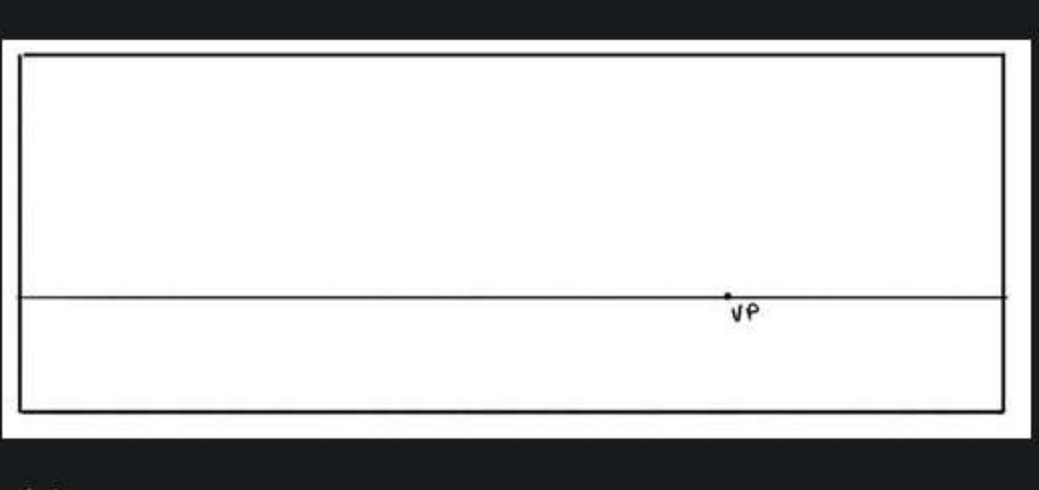
This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

LISTEN WITH DRAWABOX

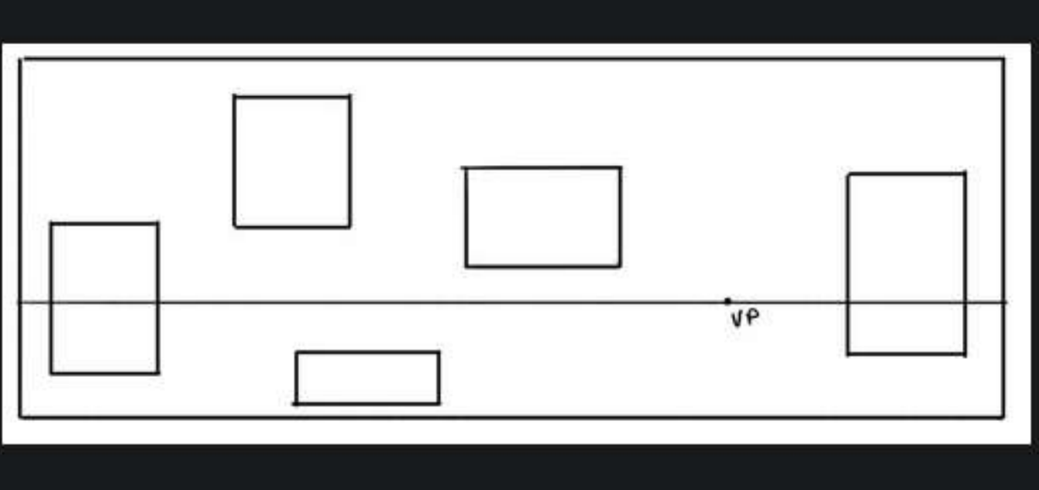


Now that we've gotten used to using vanishing points in a direct, explicit fashion, let's look at removing those training wheels and trying to estimate our convergences a little. You'll find this pattern to my approach - I'll introduce certain tools and tricks, and steadily take them away as we strip these concepts back to their core.



As before, draw a frame on the page and a horizon across it. Place a single vanishing point on it, this time, as we'll be working in one point perspective. You can place this vanishing point somewhere more central - it doesn't need to be dead center, but don't put it too far off to either side.

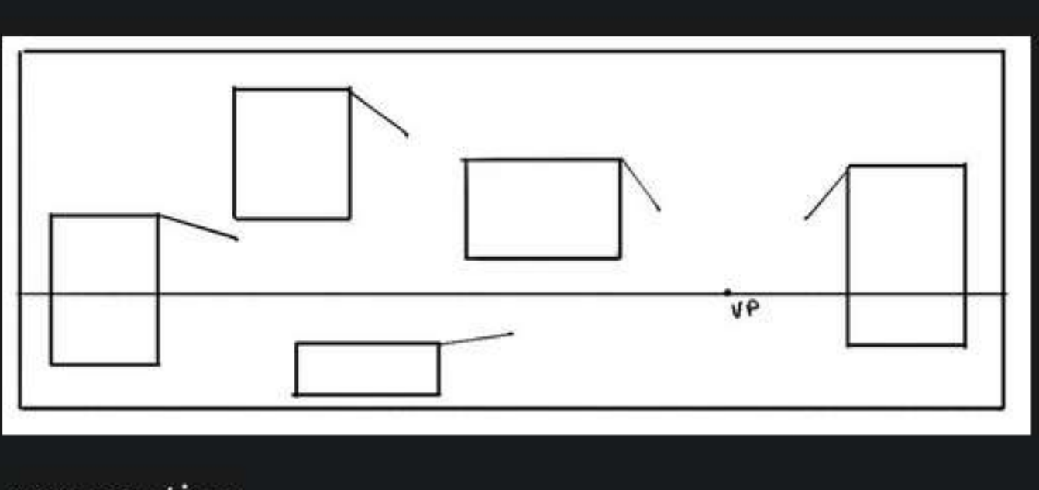
You may use a ruler or straight edge for the frame and horizon line. **Every line after this point should be drawn freehand, using the ghosting method**.



Where the plotted perspective had us start off with the edge we were facing, this time since we're using one point perspective (and therefore oriented towards a face on each of our boxes), we're going to block out those faces.

In one point perspective, one of the horizontal vanishing points of our boxes is going to be at infinity, as will be one of the vertical vanishing points. As such, all of our vertical lines will run perpendicular to the horizon, and all of the horizontal lines will run parallel to it, leaving only one set of lines that converges (towards our single vanishing point).

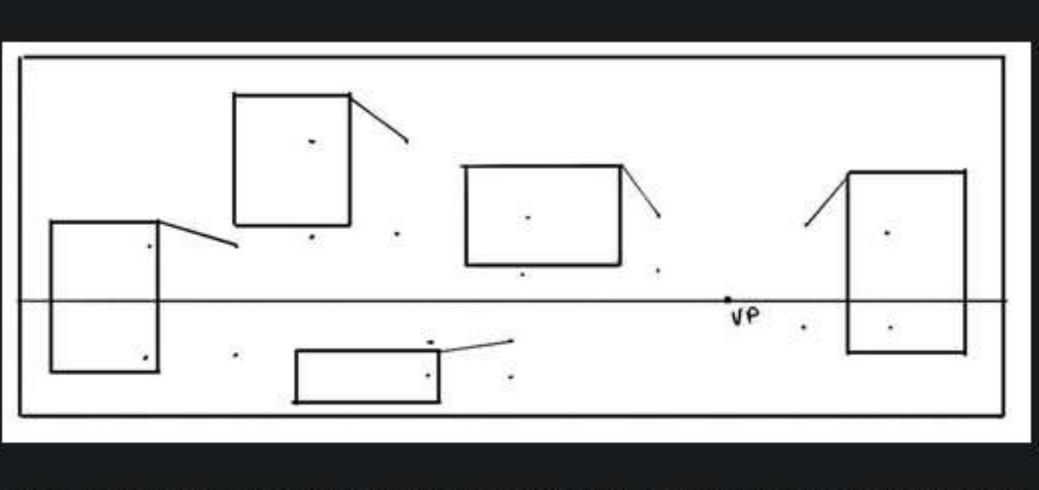
Let's draw a series of rectangles within the frame - each rectangle will serve as the front face of a different box, and will define their height and width.



Now things get a little tricky. The main limitation of this exercise is that you're not allowed to draw lines all the way back to the vanishing point. That means this is going to take a great deal of estimation - which is why it's called the *rough* perspective exercise, not *exact* perspective.

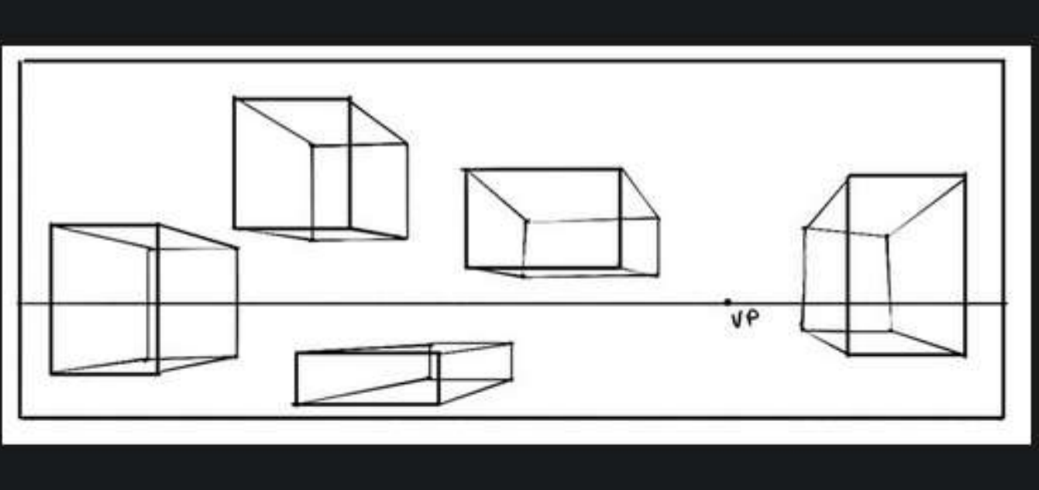
Start with just one line, coming off one corner, and draw it back towards the vanishing point, but only as far as the length you wish to give this box. And don't cheat by making your boxes super long. We're not aiming for cubes here, so the length doesn't need to match the height or width of your rectangles from the previous step.

Again, use the ghosting method. Starting out by putting little points where you want your line to start and end will help, and ghosting all the way towards the vanishing point can also help you maintain your alignment with it (but of course you can't actually draw the line all the way back).

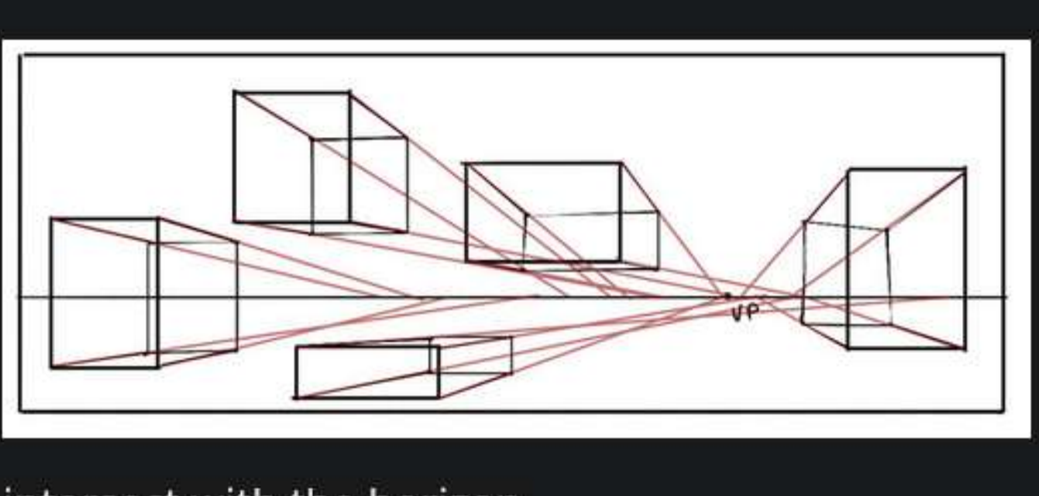


Now that all three dimensions of your boxes are established, it's just a matter of figuring out the rest of the puzzle. Place points on the page for the remaining three corners of the back of the box. Remember that your horizontal lines are still running parallel to the horizon, verticals are running perpendicular to it, and your depth lines are converging towards the horizon.

With all of this in mind, try to place your points on the page in a way that maintains all of these relationships. None of this is guesswork - there are specific rules and behaviours you follow, so if at any point you feel you're not sure what your next mark should be, step back and think about it.



Draw the remainder of your lines, connecting the points with the ghosting method. And that's all there is to it - just do it again for the rest of the rectangles in your frame.



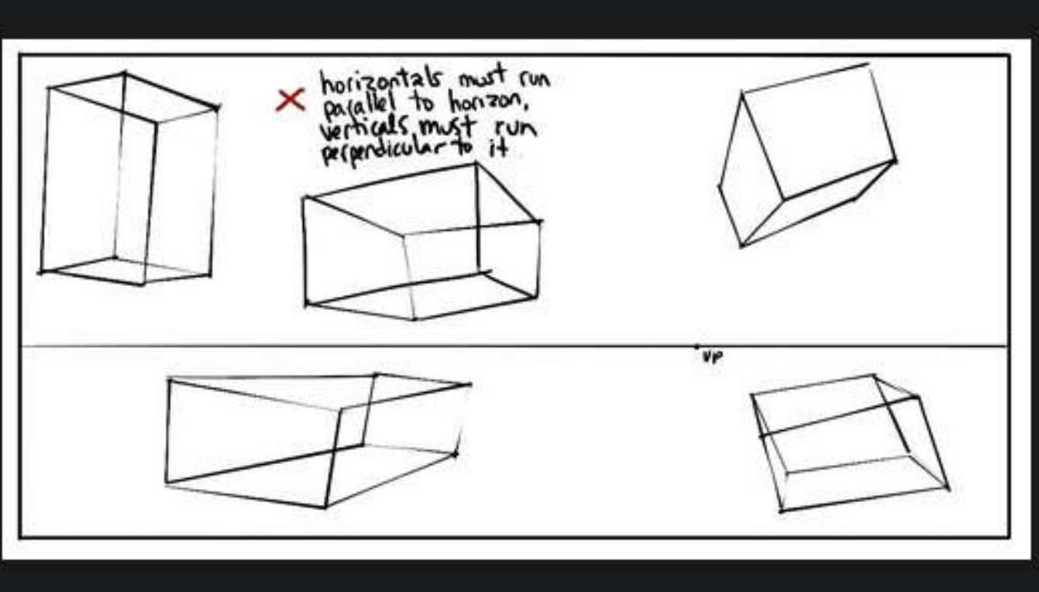
Once you're done a whole page, grab a pen of a different colour, or a pencil, or something you can visibly separate from the rest of your work. Using a ruler, take all of your *depth* lines (those that are meant to converge towards the vanishing point) and extend them to where they intersect with the horizon.

We are **not plotting these red lines back to the VP** - just to the horizon line. This will show us a concrete idea of how far off we were.

There's a good chance that you'll find them not intersecting with it at the vanishing point, and you may also find that the further away your boxes are from the VP, the further off they are in their alignment. This is totally normal, and it helps a great deal to go over our work in this manner to help identify where our estimation of perspective tends to drift, so we know what to focus on during our next attempt.

The purpose of this exercise

This exercise is all about separating you from the explicit reliance on plotting everything back to your vanishing point and getting used to the fact that your parallel lines converge. Due to the nature of perspective, with the innumerable vanishing points that may be necessary in a given scene, we can't necessarily rely on all of them being explicitly drawn out, especially if we don't want to spend the better years of our lives plotting it all out. As such, there's a lot of value in learning about how the lines themselves behave on their own, as well as coming to appreciate the fact that often times "close enough" is more than good enough. Even though you've got mistakes in your estimations, the boxes still are likely to look pretty close to correct, and ultimately there are more important things than perfection when it comes to getting an idea across with visual means.


✕ horizontals must run parallel to horizon, verticals must run perpendicular to it
VP

Mistake: Guessing

When adhering to a strict perspective system (one point, two point, three point), you immediately give up a fair bit of flexibility in terms of how the objects you're drawing will be oriented. For example, if everything is drawn according to the same two vanishing points, it will be as though everything was placed on a set grid.

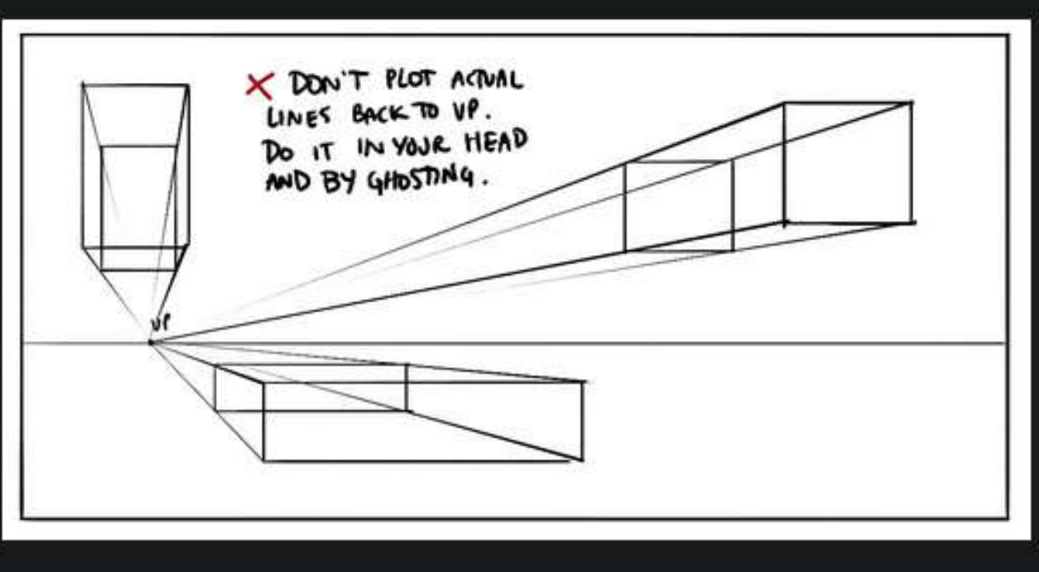
There is a vast advantage to this however - because the orientation of objects becomes restricted, we limit the possible behaviour of every line to only a few options. Many students ignore this fact, however - they lay out their vanishing point(s), then assume they'll know by instinct how every line should behave. **Instead of knowing, they guess**.

If you ever catch yourself guessing or uncertain about how to draw a line, stop and step back. Take a look at the system you're working with, and think about the short list of possible behaviours. In one point perspective (which we are using for this exercise), you have the following behaviours:

1. All lines that go off into the distance converge at the vanishing point
2. All horizontal lines run perfectly parallel to the horizon
3. All vertical lines run perfectly perpendicular to the horizon

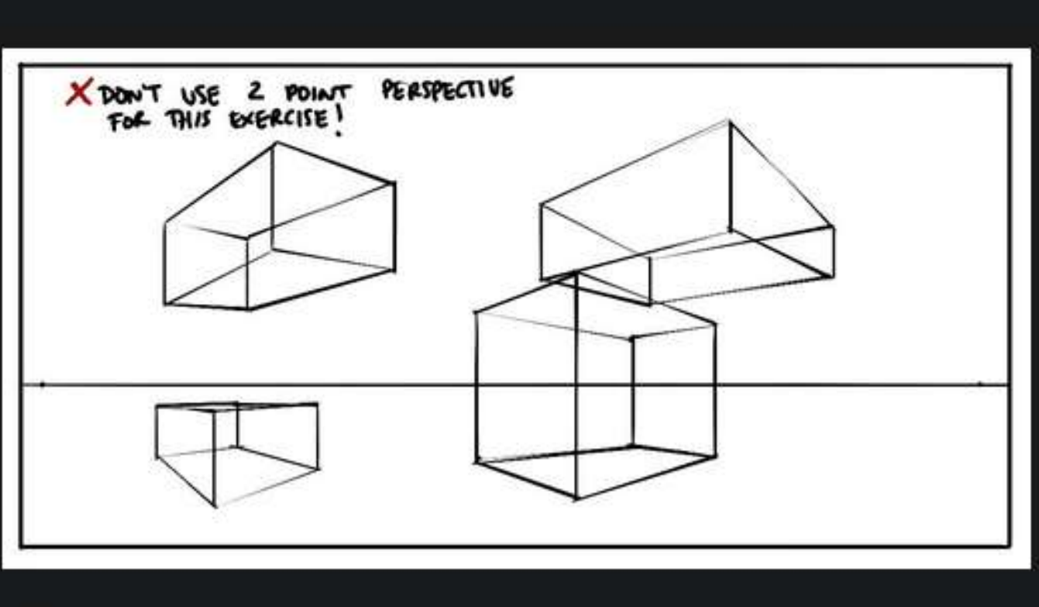
There are simply no other options. Every single line will adhere to one of these three behaviours. So, find which one matches the line you're trying to draw, and then apply it.

It is fair to say that in one point perspective, you can have lines that don't run parallel or perpendicular to the horizon, but - these rules are going to hold fast here however because for the purposes of this exercise, all of our boxes are going to run parallel to the ground plane, rather than being slanted or angled.


✕ DON'T PLOT ACTUAL LINES BACK TO VP. DO IT IN YOUR HEAD AND BY GHOSTING.
VP

Mistake: Plotting lines back to VP

So the point of this exercise is to get used to visualizing the lines going back to the VP in your mind's eye, rather than actually drawing them on the page. So, instead of drawing those lines, you can work on your accuracy by ghosting the lines all the way back to get a good angle, then drawing only the segment required for the box you're drawing.

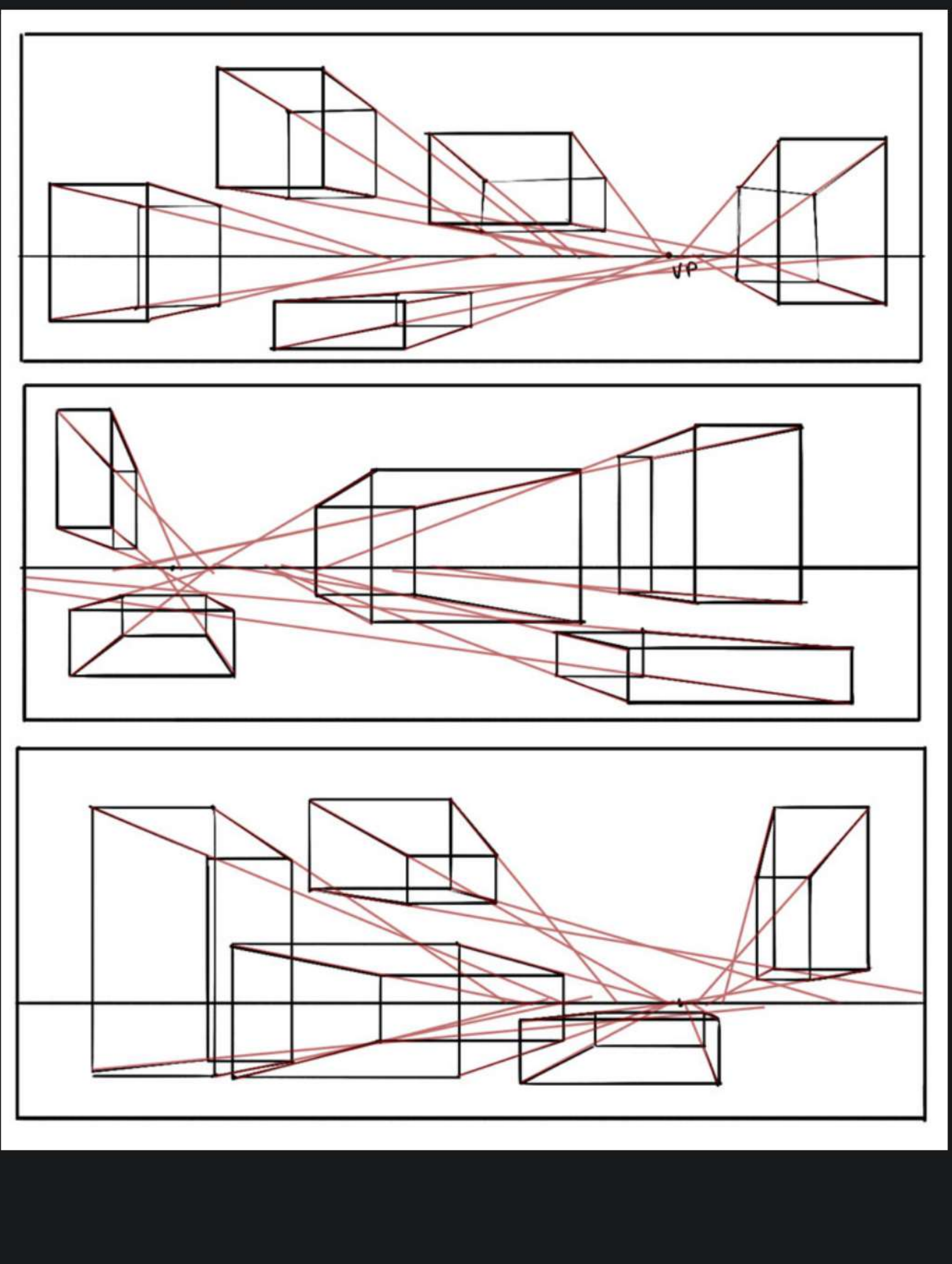


Mistake: Not using 1 point perspective

Every now and then I'll have a student submit work for this exercise that has more than one vanishing point. I want you to use only one because it allows you to focus more on the challenge of aligning your lines back to that one VP. Giving yourself multiple things to worry about isn't going to help you learn any quicker, it'll instead slow you down. As such, each exercise is designed with a strategically chosen set of goals.

Example homework

And here's what a full page would look like.



<<< Boxes

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The Science of Deciding What You Should Draw

Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

WHAT THE HELL AM I SUPPOSED TO DRAW?!

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VIEW HOMEWORK SUBMISSIONS

SUBMIT HOMEWORK FOR REVIEW

Some Quick Reminders
- Video vs. Text
- But Comfy! I have trouble with reading!

Lines: Using Your Arm
- Drawing from your wrist and shoulder
- Old habits
- The pivots of the arm
- Let's keep it simple
- Do you mean I can't ever draw with my wrist or elbow?
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- The Principles of Markmaking
- Marks should be continuous and unbroken
- But that artist uses chicken scratching all the time!
- Marks must flow smoothly
- Marks must maintain a consistent trajectory

Lines: Homework
- Don't forget!
- Homework and exercises

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- What is an ellipse?
- 2D vs 3D
- Circles in 3D space
- Degree
- Degree shift
- Minor axis
- Normal vector
- Cylinders
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- Boxes and perspective
- Not a perspective course
- 2D vs 3D
- Projection

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- Conveying distance
- Foreshortening
- As things move farther away, they appear smaller
- Vanishing points
- As applied to a box
- Horizon line
- What happens when a set of edges rotates?

Boxes: Rotation, Perspective Grids, and the Concept of Infinity
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- How we look at the scene
- A different point of view
- Circular horizon
- Infinite vs non-infinite
- Vanishing point at infinity
- 0 point perspective does not exist

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- 1 point perspective simplified
- 2 point perspective simplified
- 3 point perspective simplified

Boxes: Additional Notes
- Foreshortening
- Horizon line, eye line, axis
- Distortion
- Placing vanishing points

Boxes: Homework
- Homework and exercises

What Next?

Lesson 1: Lines, Ellipses and Boxes

Rotated Boxes

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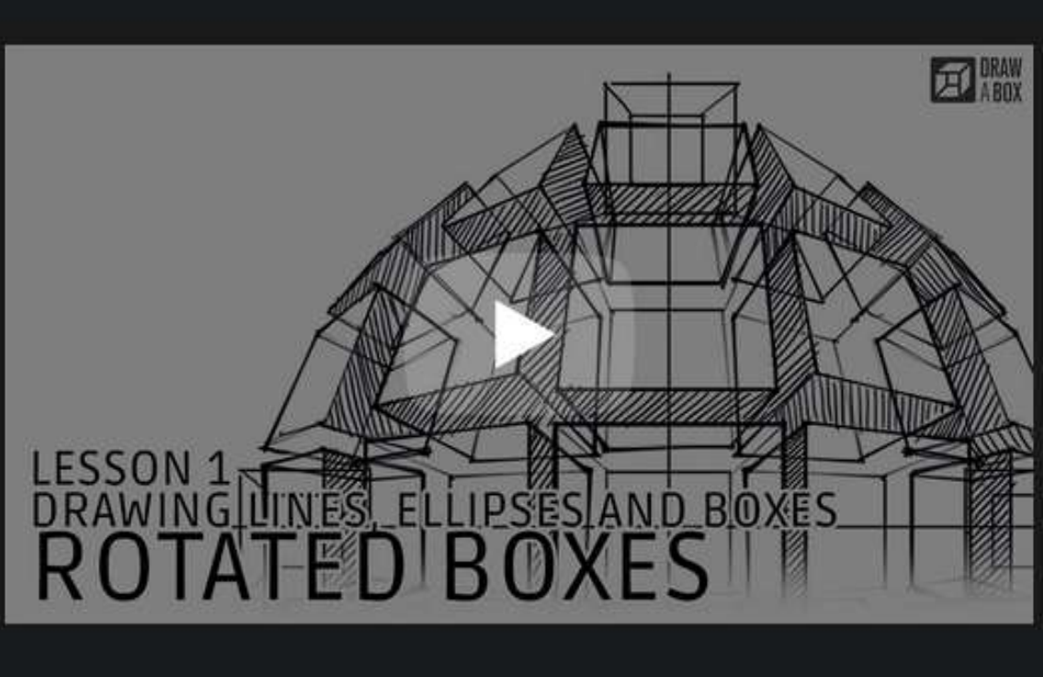
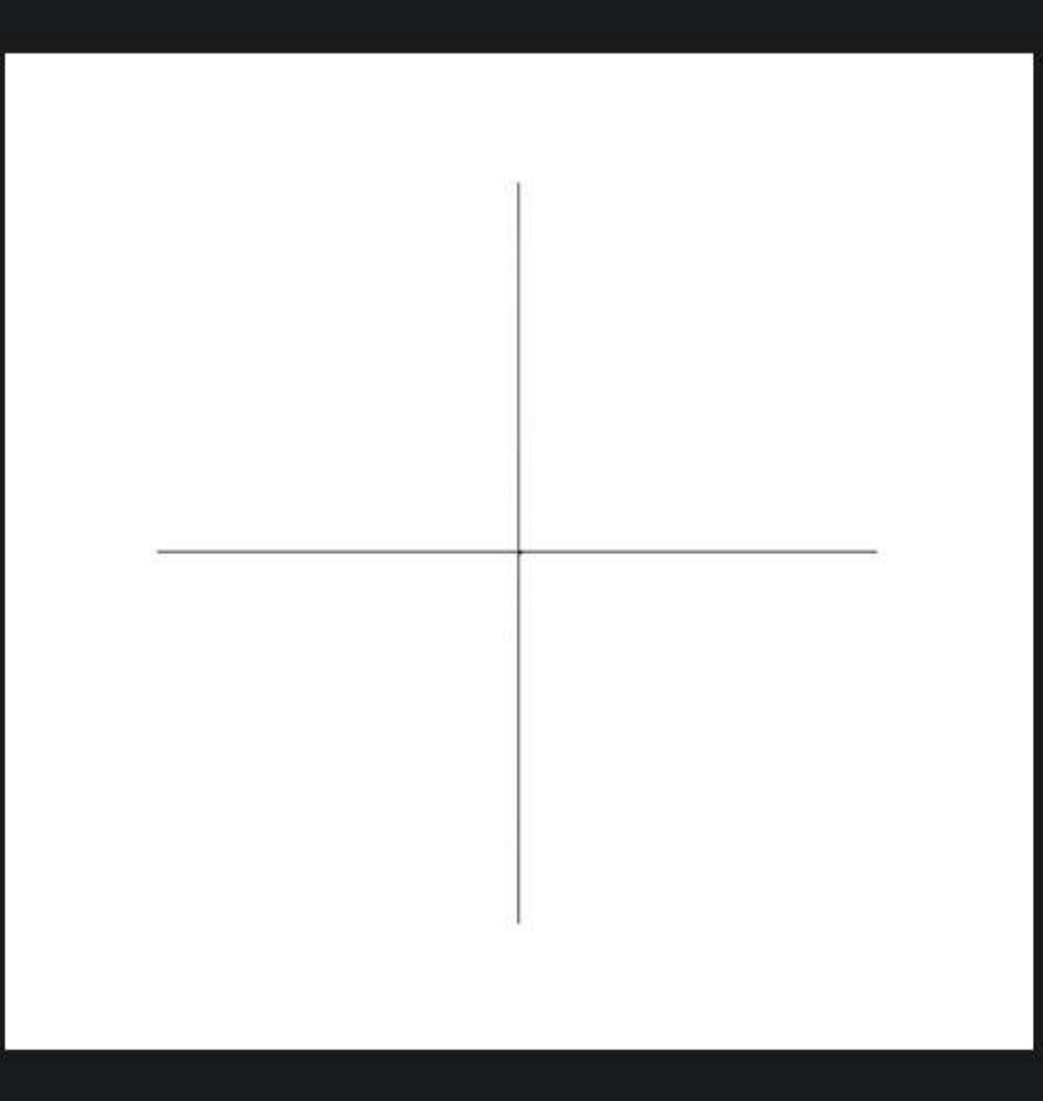

DRAW A BOX
LESSON 1
DRAWING LINES, ELLIPSES AND BOXES
ROTATED BOXES

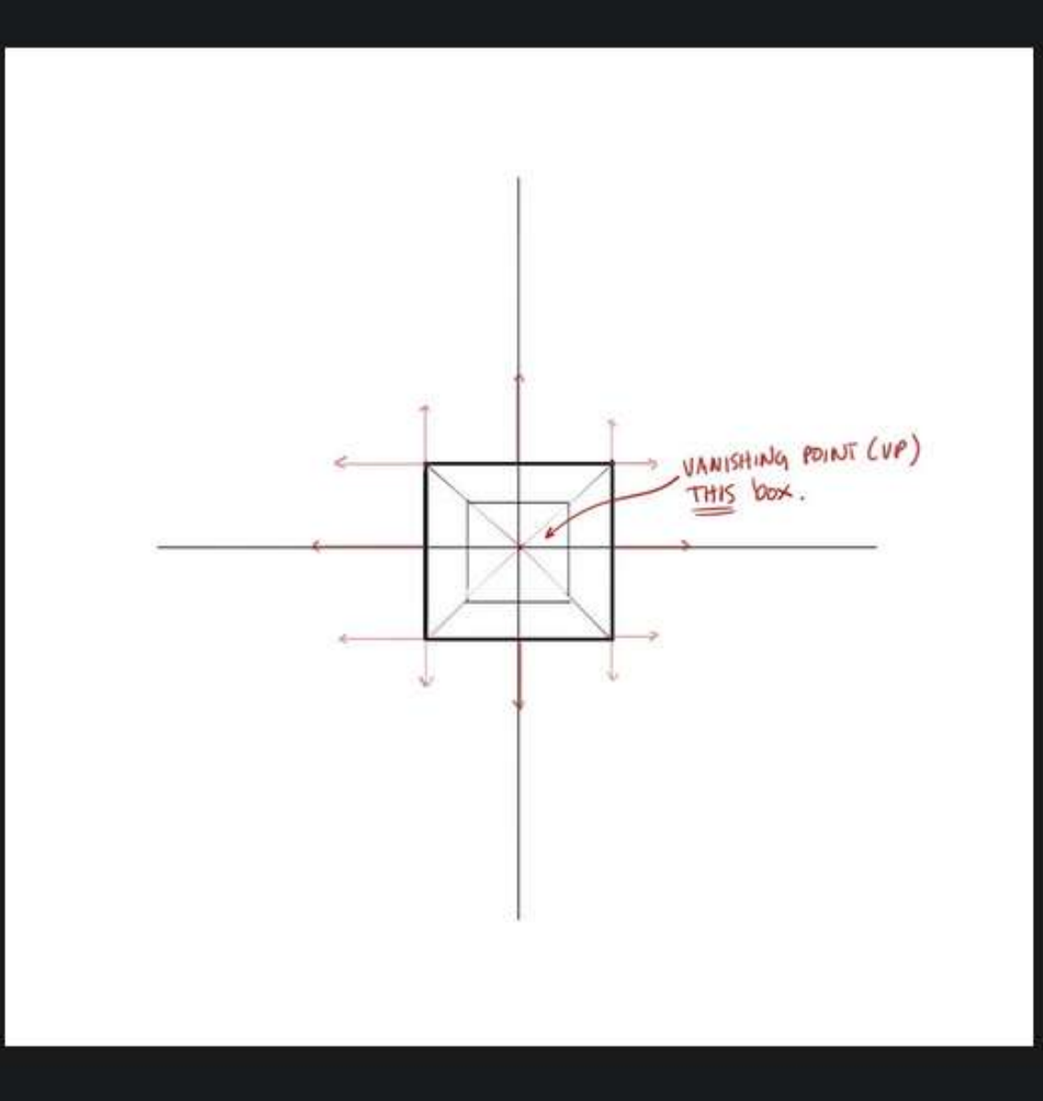
This is going to be the first major exposure to something I do sometimes with my lesson's exercises: assigning tasks that are not necessarily going to be within your current ability to complete. To put it simply: **these are probably going to be too hard for you**. But that doesn't matter - you should still do them.

All I ask is that you complete the exercise - not perfectly, not even well. Just finish it to the best of your current ability. I ask for nothing more than that.

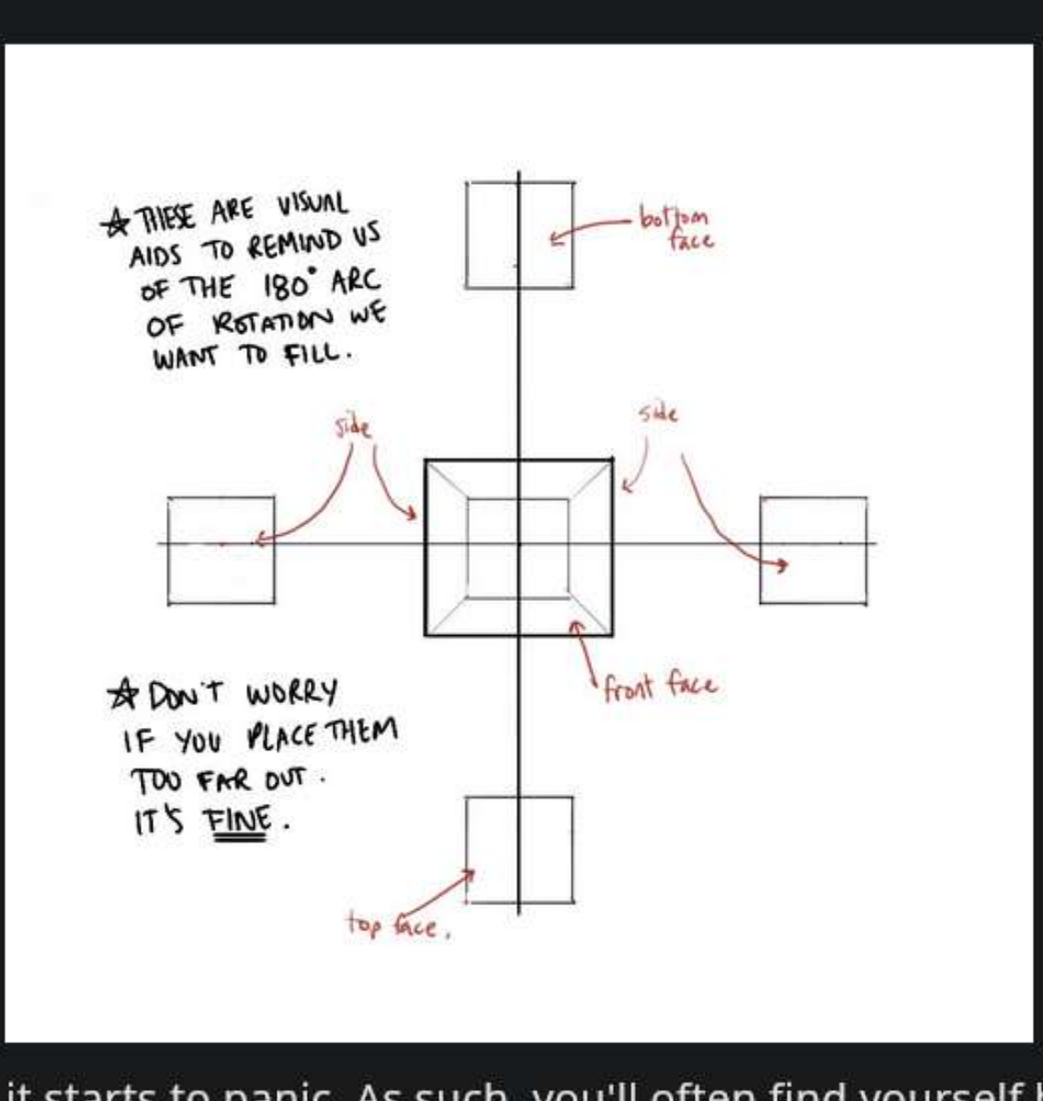


So we're going to start off by drawing a vertical and a horizontal axis. If you read the extra notes on the horizon, eyeline and horizontal object axis, you'll know that these lines are where two of our three vanishing points are going to sit.

You can draw these axes with a ruler or straight edge, but all the boxes will be drawn freehand with the ghosting method.



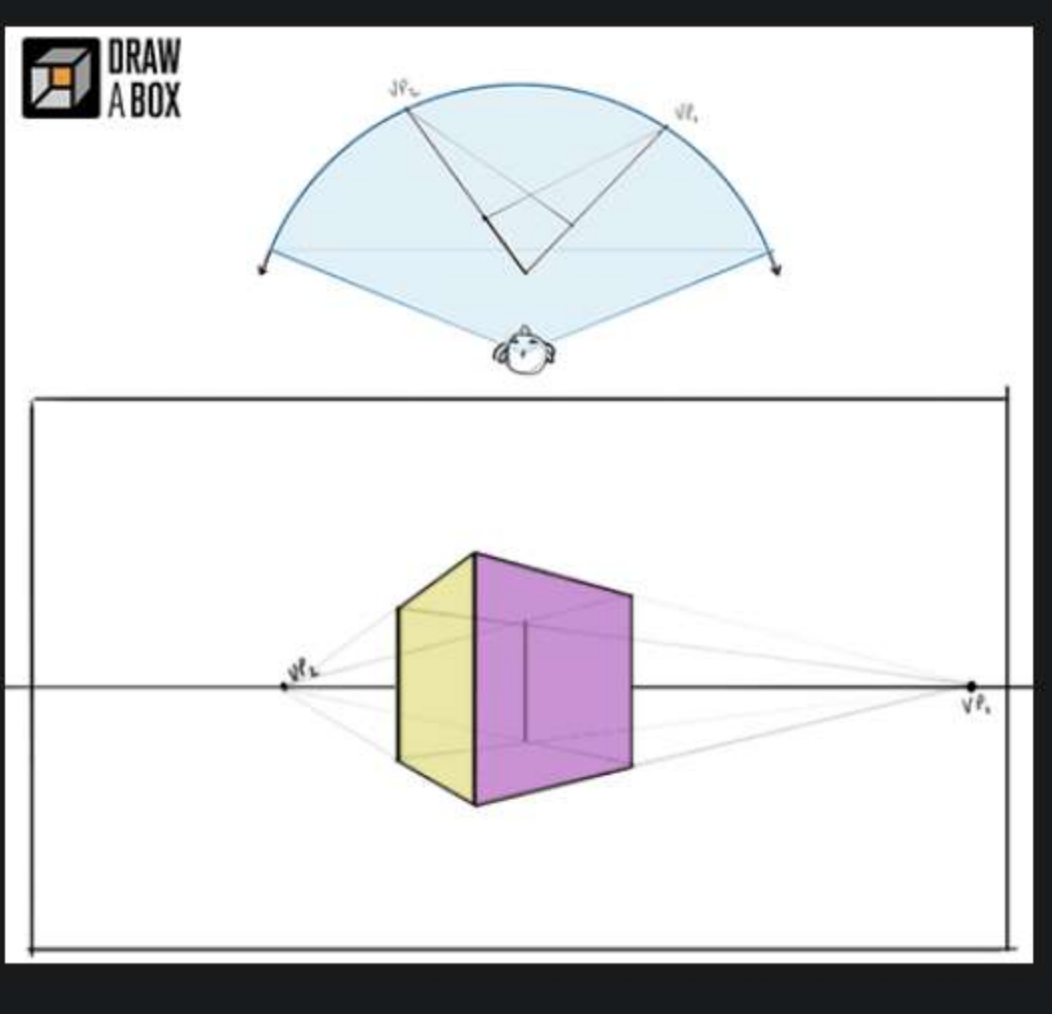
To start with, we're going to draw a box in the middle. It'll be a square, but I want you to go ahead and draw through it, adding the lines that can't generally be seen without x-ray vision. We'll be doing that for all of our boxes in this exercise, because it helps us to better understand how they sit in 3D space, and how that changes as they are rotated.


★ THESE ARE VISUAL AIDS TO REMIND US OF THE 180° ARC OF ROTATION WE WANT TO FILL.
bottom face
side
side
front face
★ DON'T WORRY IF YOU PLACE THEM TOO FAR OUT. IT'S FINE.
top face.

Next, to provide us with some sort of visual reference as to the full range of rotation we want to fill, go ahead and place similar squares on the far ends of both axes. These are just going to serve as a reminder, but they represent boxes that have been rotated a full 90 degrees relative to the center.

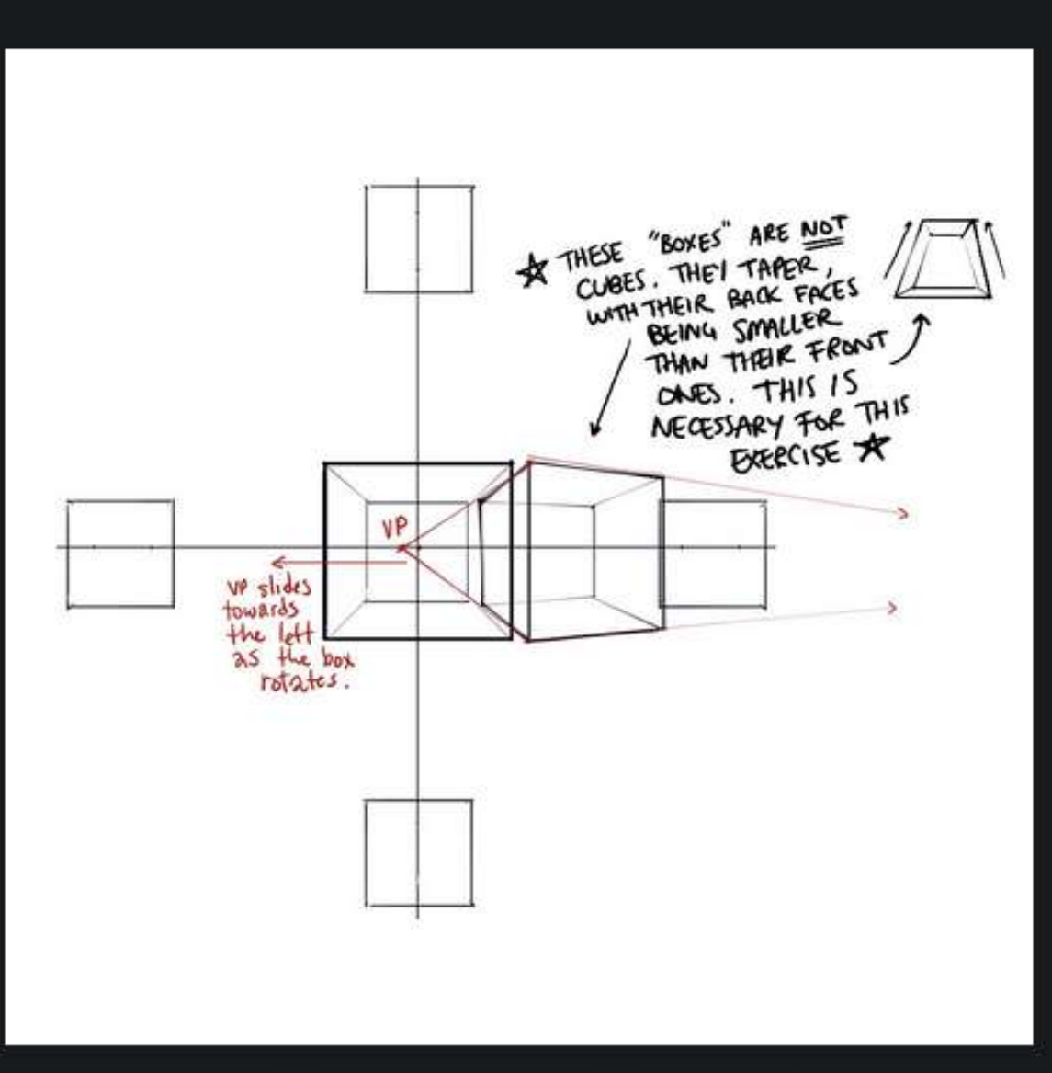
In all likelihood, you may end up placing these too far out - don't worry about it. You don't need the boxes to line up to these, they're just there to remind your brain that you're trying to cover a full 180 degrees for each axis.

Our brains actually don't like it when we rotate objects - they prefer things to stick to nice, clean grids, so as soon as something is turned, it starts to panic. As such, you'll often find yourself being tricked into thinking you've rotated a box more than you actually have, resulting in you covering a much smaller range of rotation in the end. These stand-ins at each end help combat this by being a constant reminder of what you're trying to achieve.



Now lets take a break and talk about the rotation of a box. In this animated diagram, you can see that as this box is turned on its vertical axis, its two horizontal vanishing points slide along the horizon line. The distance between the vanishing points stays the same - they're just skittering along.

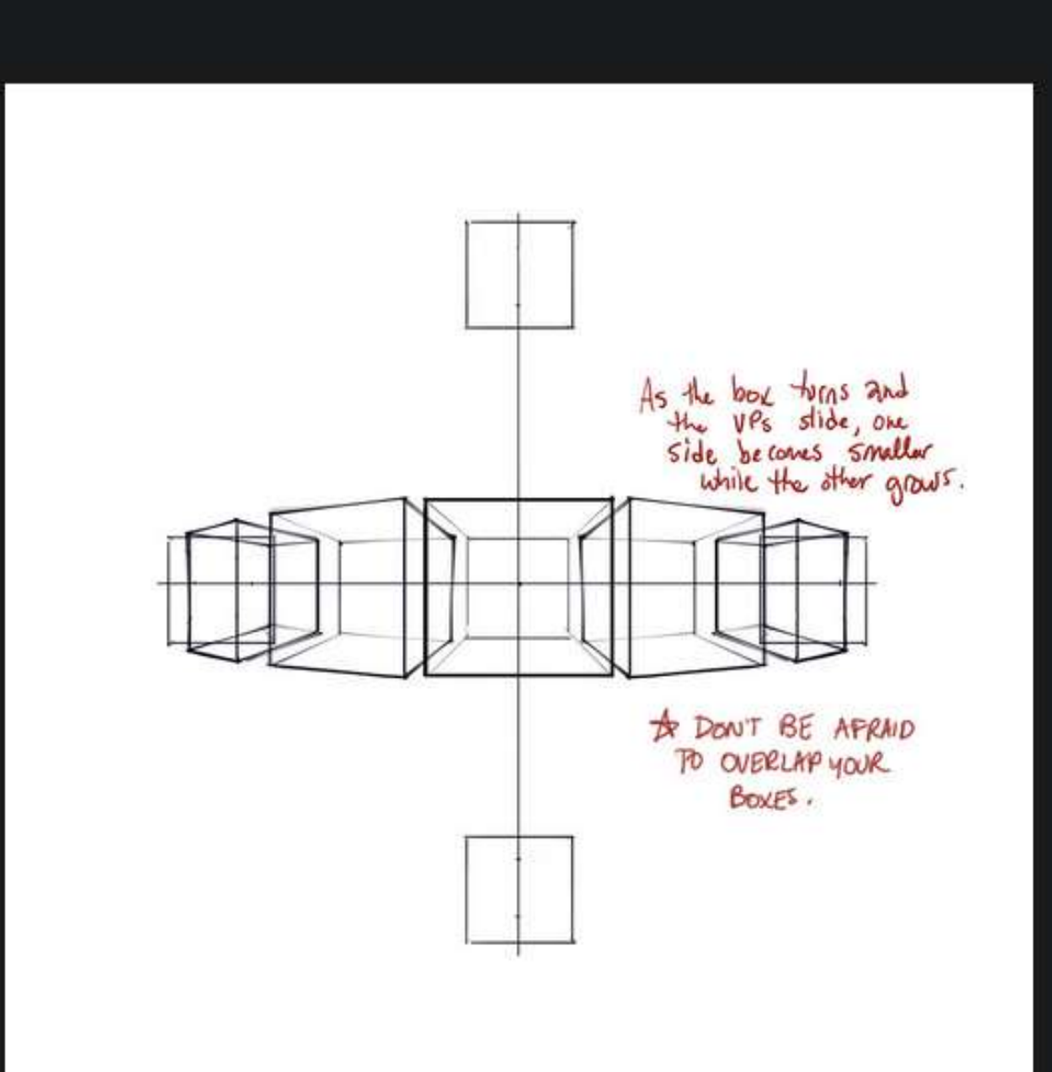
As it rotates, the convergence towards one vanishing point becomes more gradual, with the VP moving further and further from the box, eventually going to infinity. The other VP comes closer and closer however, and its convergence gets more rapid.


★ THESE "BOXES" ARE NOT CUBES. THEY TAPER, WITH THEIR BACK FACES BEING SMALLER THAN THEIR FRONT ONES. THIS IS NECESSARY FOR THIS EXERCISE ★
VP
VP slides towards the left as the box rotates.

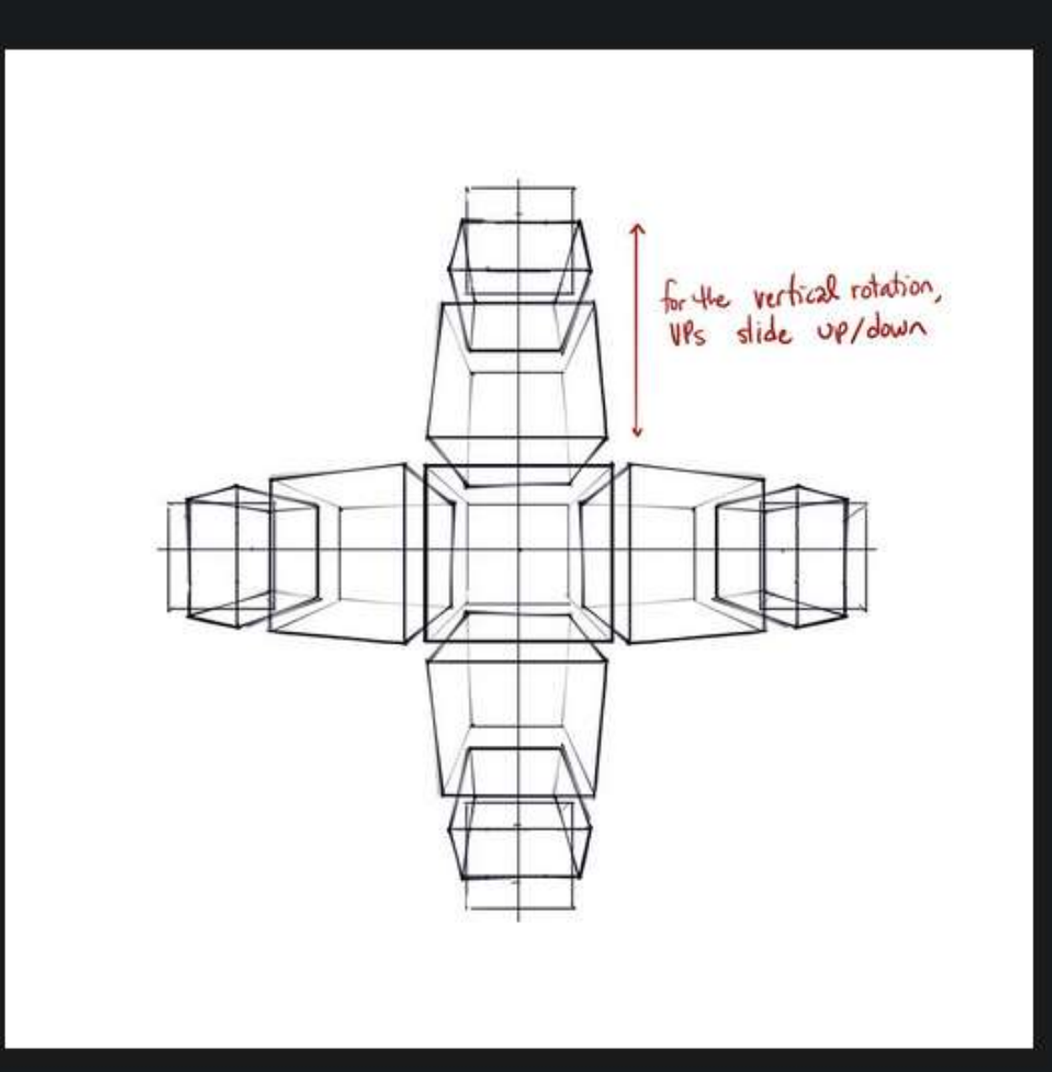
Now, let's draw our first rotated box, following the principles demonstrated in the animated diagram above. The vanishing points slide along the horizon, and the convergence of one set of lines becomes more gradual, and the other becomes more dramatic.

Something worth noting: **they're not actually cubes**. In order for this exercise to work and for all of the boxes to stay nice and tightly packed together, we're actually going to be using boxes that are not perfectly rectilinear or cuboid. Meaning, the far end of our boxes are going to be smaller than the closer end, so they taper in one dimension.

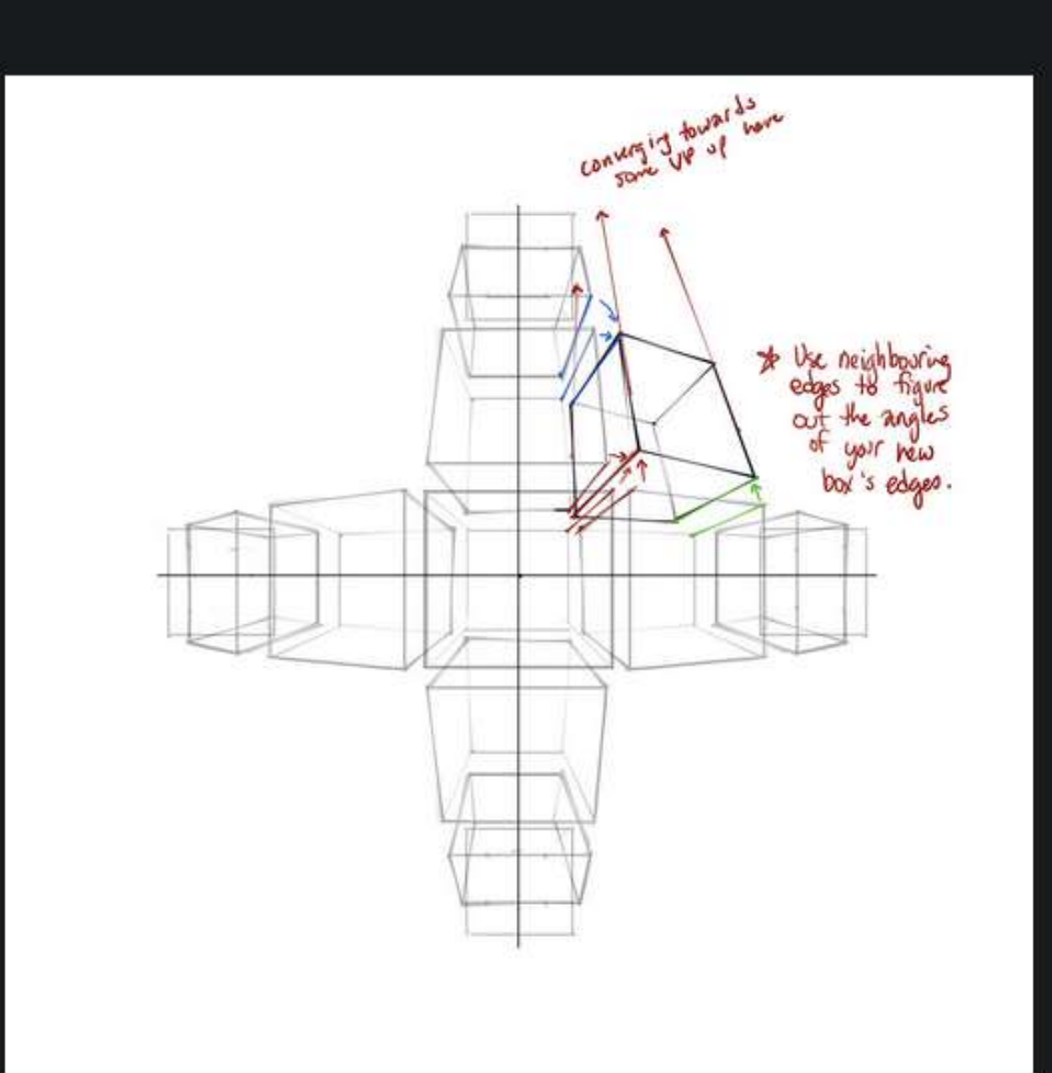
It's actually not that important to keep this in mind, but it is a point that has confused some of those who've thought a bit too hard about that particular aspect and distracted themselves with it. So yes - the boxes are tapered, they're not cubes.


As the box turns and the VPs slide, one side becomes smaller while the other grows.
★ DON'T BE AFRAID TO OVERLAP YOUR BOXES.

As you add more boxes to fill out your axis (note that I specifically want you to draw 2 on either side of the center one, no more than that and no less), keep your boxes packed together with narrow, consistent gaps between them. They will overlap one another, and that's fine. I also want you to continue drawing through them as you have been thus far.

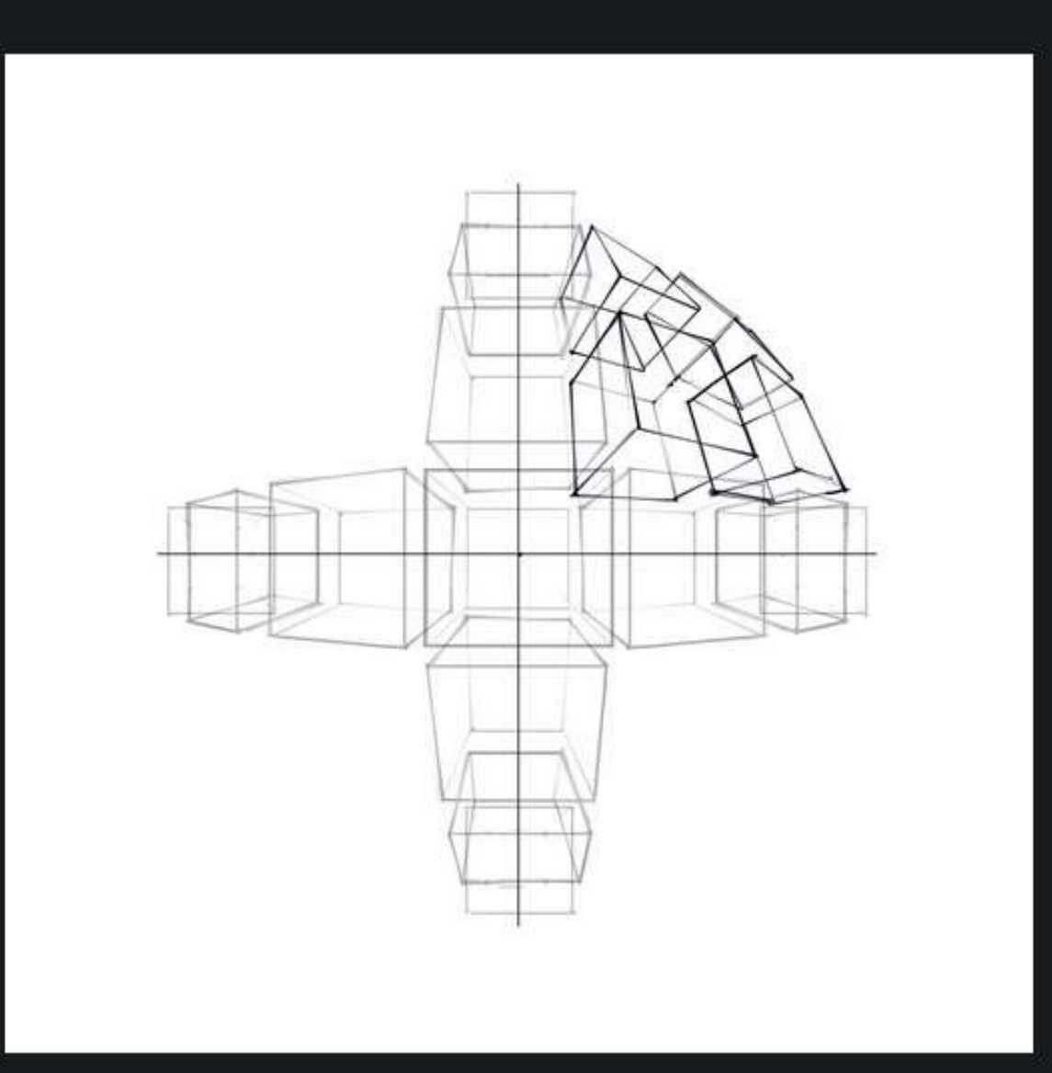


Do the same thing for the vertical axis. It's no different from the horizontal one, especially since you'll be rotating your page around plenty in the use of the ghosting method, so up, down, side to side really loses meaning.


converging towards some VP up here
★ Use neighbouring edges to figure out the angles of your new box's edges.

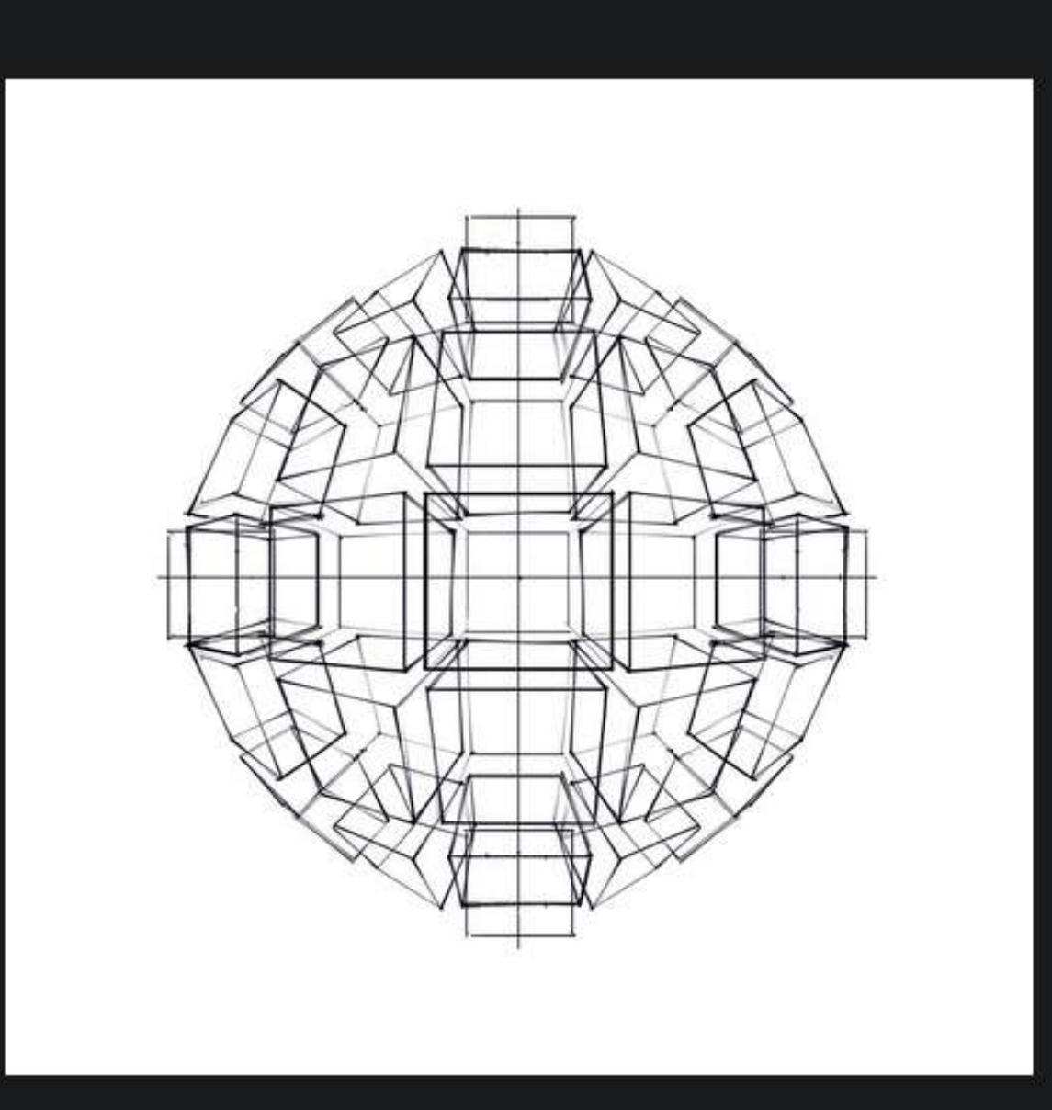
Now, the corners - this is where a trick that you hopefully have already been taking advantage of comes into play. The fact that we've been keeping our boxes close together is critical because it allows us to use neighbouring edges as hints when adding new lines.

Notice how in this example, I've colour coded sets of lines shared by different boxes that are very close to running parallel to one another? This is very useful information. As you construct forms and objects, you can often find information present in their surroundings - especially the things physically closest to them. This can allow you to infer how certain lines should behave without having to think about far-off vanishing points.



Keeping this up, fill in the rest of the boxes. The corners are the most difficult, especially as you get all the way out to the extreme corners. All the same, I want you to complete this exercise even if attempting the hard parts is going to muck up the whole page.

That's completely fine - we're not drawing something for you to pin on your fridge in triumph. The value here is in the doing of it, not the result.



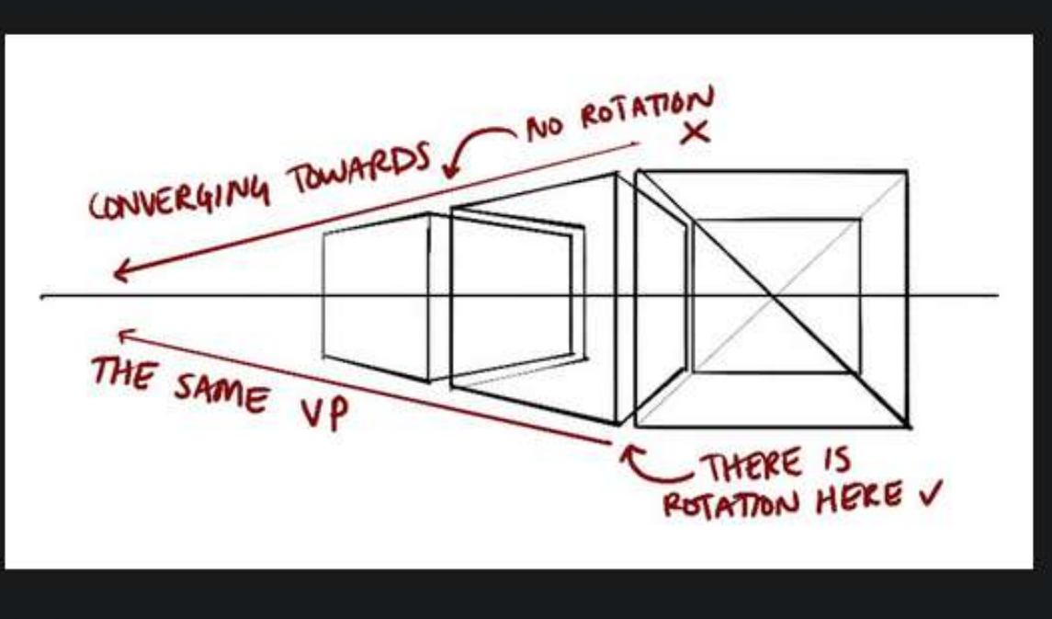
Continuing along, you'll eventually have the whole set done. There are going to be a lot of lines floating around, so keeping them all straight in your head will be a challenge, but you can use some strategically placed line weight to help clarify where certain forms overlap. Just make sure that when you add line weight, you're doing so with a confident stroke using the ghosting method, just as you would when initially drawing the line.

The purpose of this exercise

While serving as a bridge between the previous two exercises (where we have explicit vanishing points present on the page) and the next one (where you've got no vanishing points whatsoever), the rotated boxes exercise is also about learning to infer information about space and the arrangement of objects from neighbouring objects. Each box has others beside, above and below it, and by the time you're drawing one, some of these others have already been constructed. While their edges don't run perfectly parallel to one another, they do have a similar enough trajectory to some of the next box's edges to provide some important information.

While we do a lot of *educated guesswork*, our estimations of convergences and perspective in general are based on a number of more grounded sources. We're still aware of vanishing points, even if they're not drawn explicitly on the page or even present within the frame. They're still there, because we can see all these lines pointing so vehemently towards them. By not being so tightly tethered however, you're given a great deal more freedom to play inside of space, adhering to the spirit of the rules without being bogged down by them.

I think this is a critical part of drawing, and puts you in a much stronger position than someone who's only learned perspective through the laborious plotting of innumerable vanishing points, reference points, measuring points, and so on, and who goes on to draw a dog without understanding how perspective can apply to it. Perspective, form, 3D space - these are all factors in *everything* we draw in some way or another, and so we need to learn to approach it in a more everyday kind of fashion.

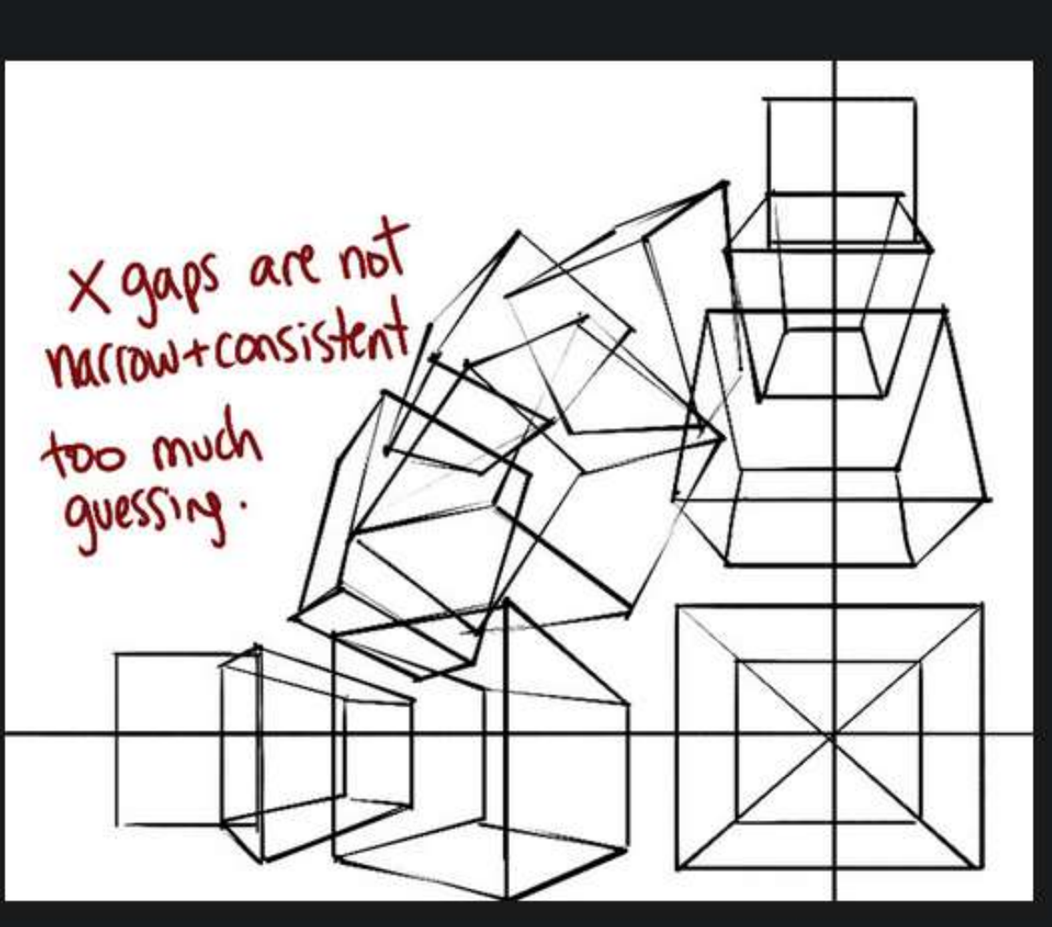


Mistake: Not actually rotating

The most common mistake I see is that students confuse the natural convergences of perspective with rotation. As you can see here, the corresponding edges of these boxes are all converging towards roughly the same vanishing point.

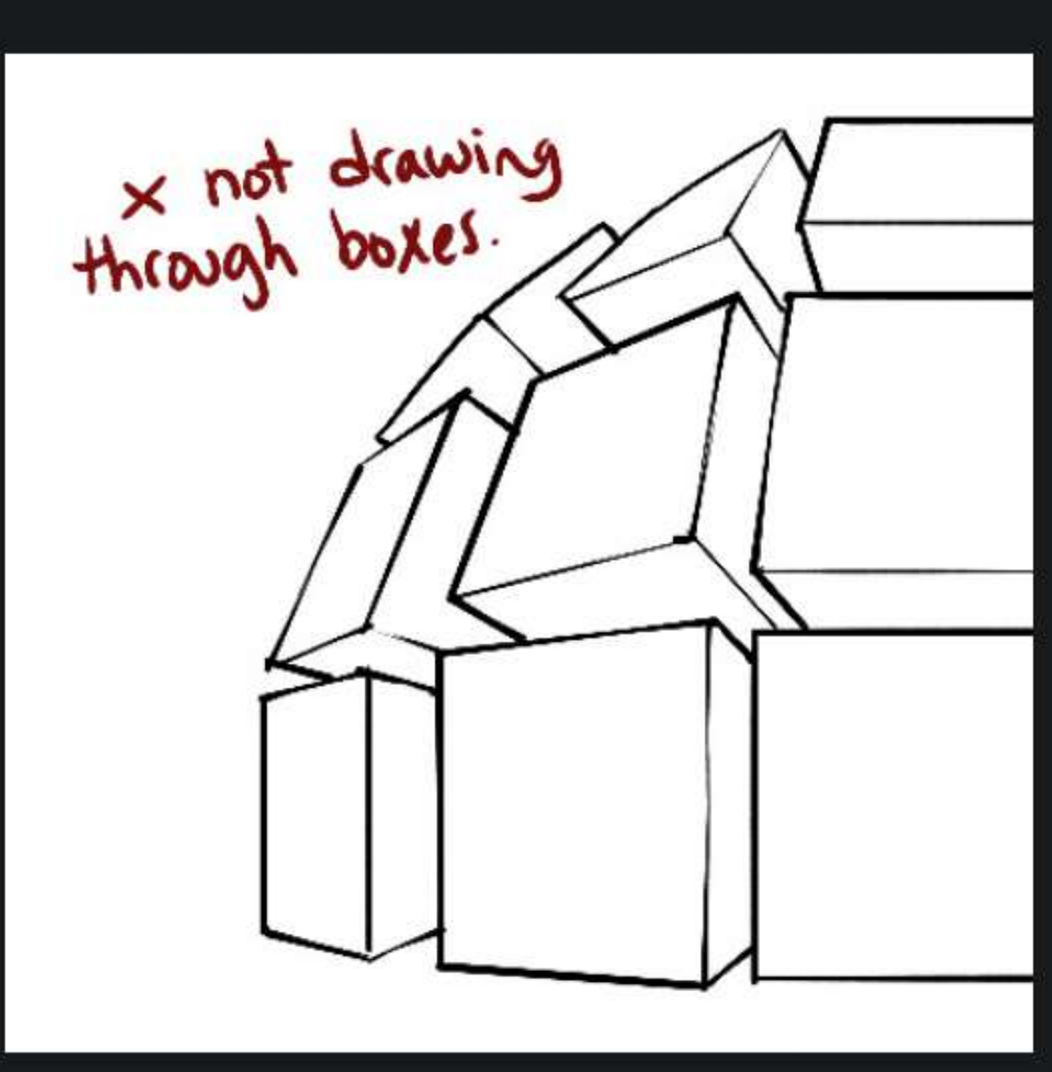
By the rules of perspective, this means that they're not rotated relative to one another, **because their vanishing points have not moved**.

This often is seen together with students stretching the boxes into the distance, as though this is the way their brain is fighting against the rotation, in its desire to keep things nice and gridlocked.



Mistake: Not keeping things together

Keeping your gaps narrow and consistent is critical to being able to use neighbouring forms as effectively as possible to infer information about space.



Mistake: Not drawing through boxes

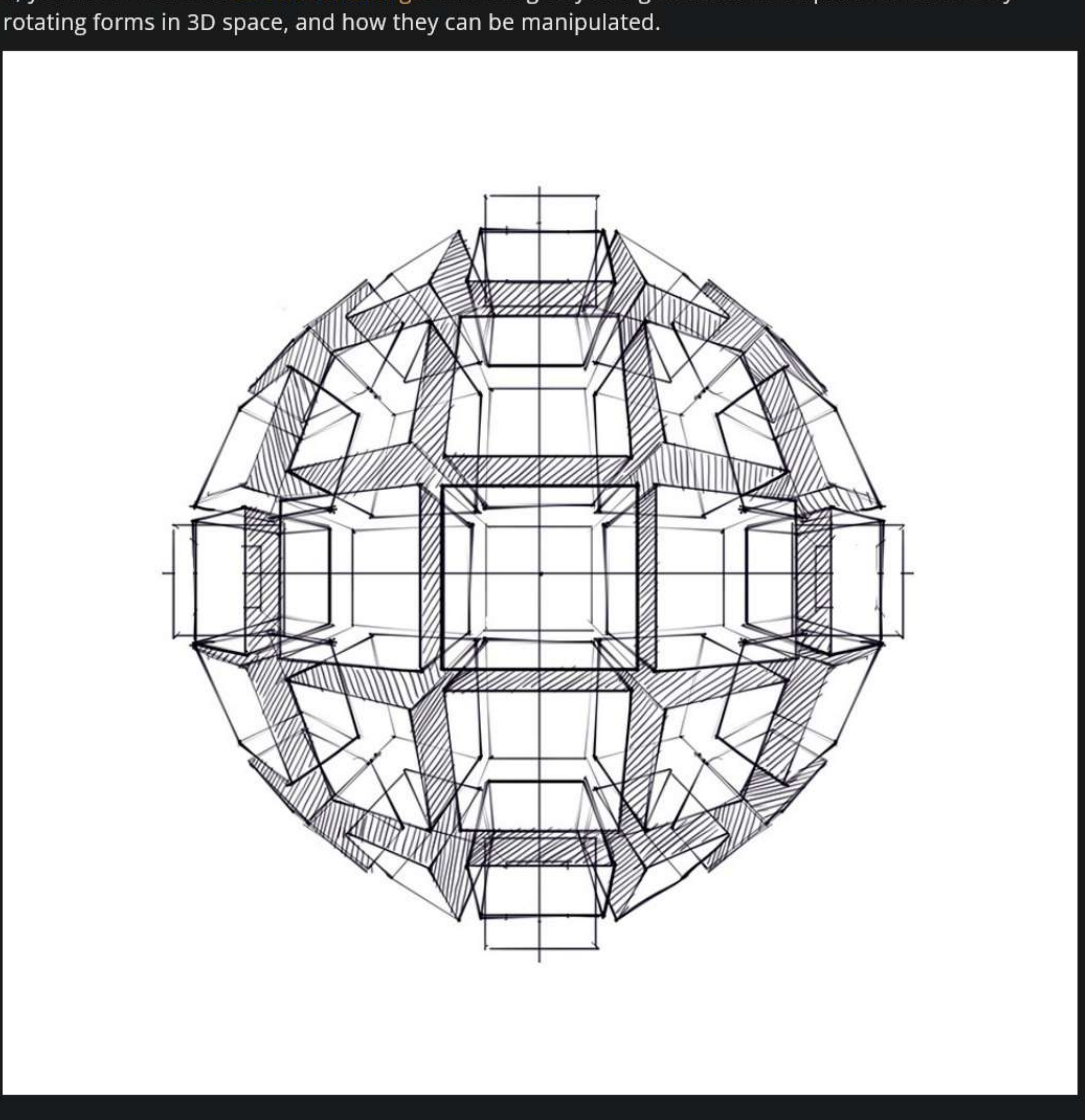
Drawing through boxes helps us to understand how those forms sit in 3D space, and how they relate to other forms that are present. That understanding of space is something that develops slowly, and we can work on it by exploring it in this manner.

If you do this exercise without drawing through your forms, you're going to end up missing on a great deal. It may look a lot cleaner, but it'll be worth a lot less in terms of what you get out of it.

Example homework

For once, I'm not going to say that this is what your work should look like when you're done - because in all likelihood, it won't. If it doesn't, I don't want you to fuss over it - as long as you've completed it and drawn each and every box and made an attempt to achieve a full range of rotation on each axis, then move onto the next exercise.

If you've struggled with this exercise, then I'd recommend that once you complete the rest of lesson 1, you move onto the 250 box challenge. This will give you a great deal more practice with freely rotating forms in 3D space, and how they can be manipulated.



<<< Boxes

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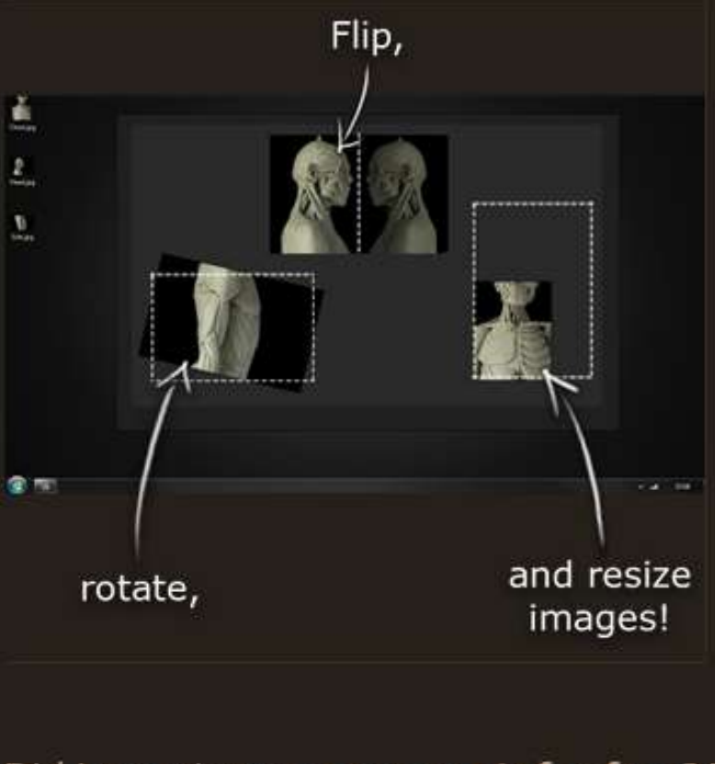

PureRef

This is another one of those things that aren't sold through Amazon, so I don't get a commission on it - but it's just too good to leave out. PureRef is a fantastic piece of software that is both Windows and Mac compatible. It's used for collecting reference and compiling them into a moodboard. You can move them around freely, have them automatically arranged, zoom in/out and even scale/flip/rotate images as you please. If needed, you can also add little text notes.

When starting on a project, I'll often open it up and start dragging reference images off the internet onto the board. When I'm done, I'll save out a '.pur' file, which embeds all the images. They can get pretty big, but are way more convenient than hauling around folders full of separate images.

Did I mention **you can get it for free**? The developer allows you to pay whatever amount you want for it. They recommend $5, but they'll allow you to take it for nothing. Really though, with software this versatile and polished, you really should throw them a few bucks if you pick it up. It's more than worth it.

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What Next?

Lesson 1: Lines, Ellipses and Boxes

Organic Perspective

Hate to read? No problem. **We can read the text to you**.

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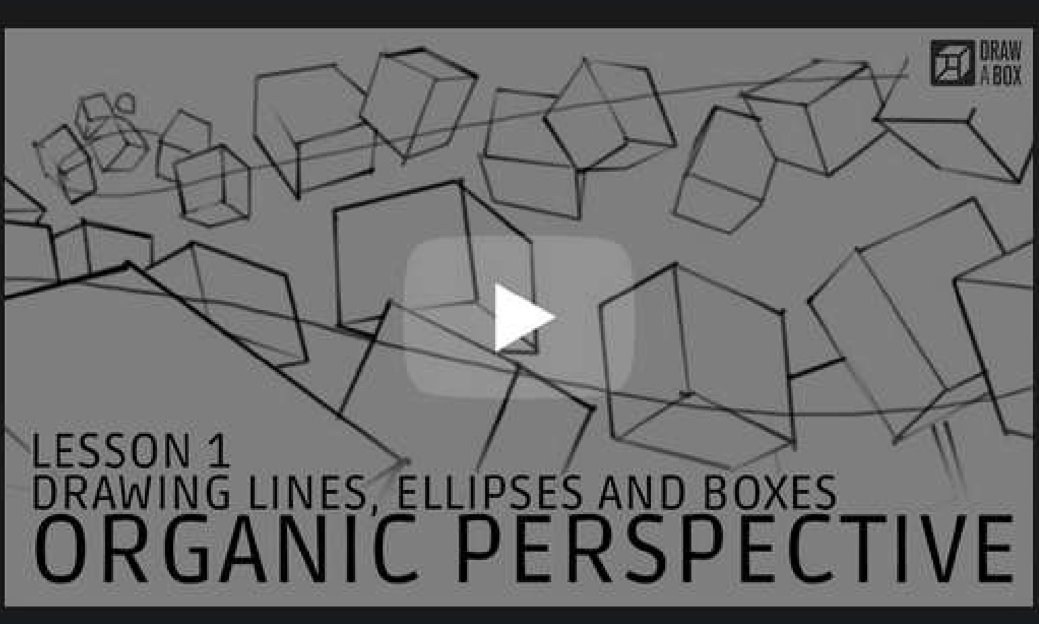
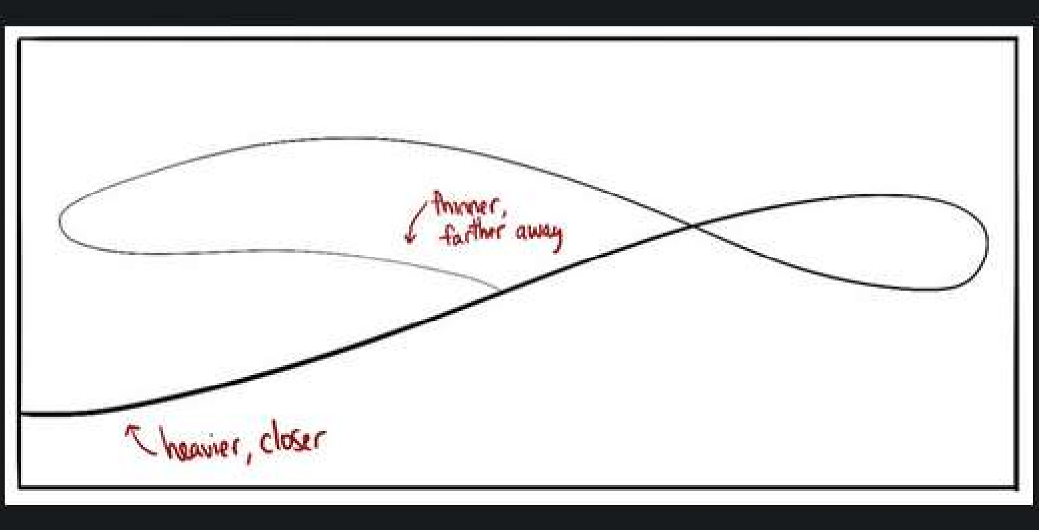
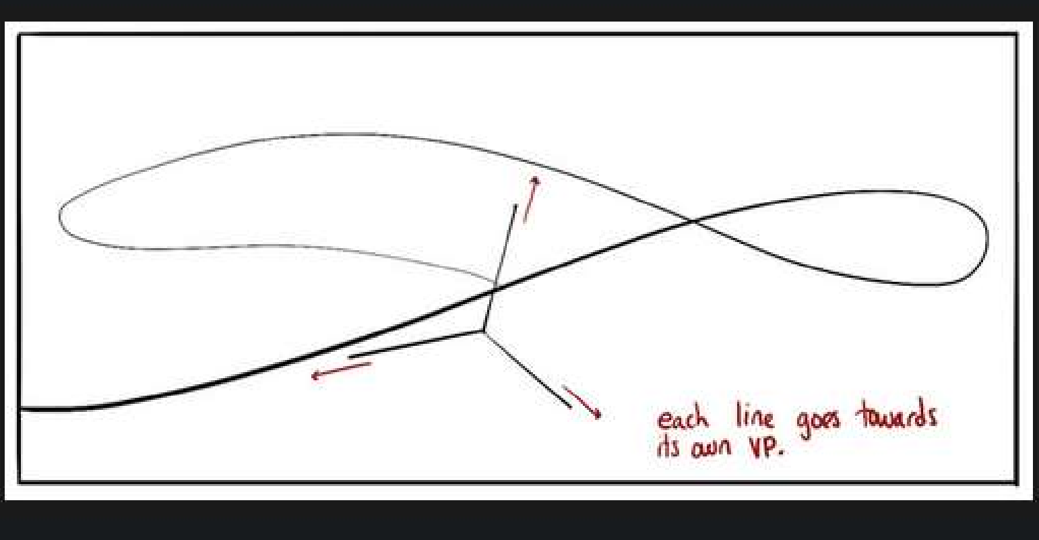


This is the last exercise of lesson 1, and it's a doozy. Like the rotated boxes, what I want most is for you to complete the recommended number of pages to the best of your *current* ability. No more, no less. We're not looking for you to impress anyone, but rather to face the challenges head on so they can start making you think and consider a new kind of spatial problem.



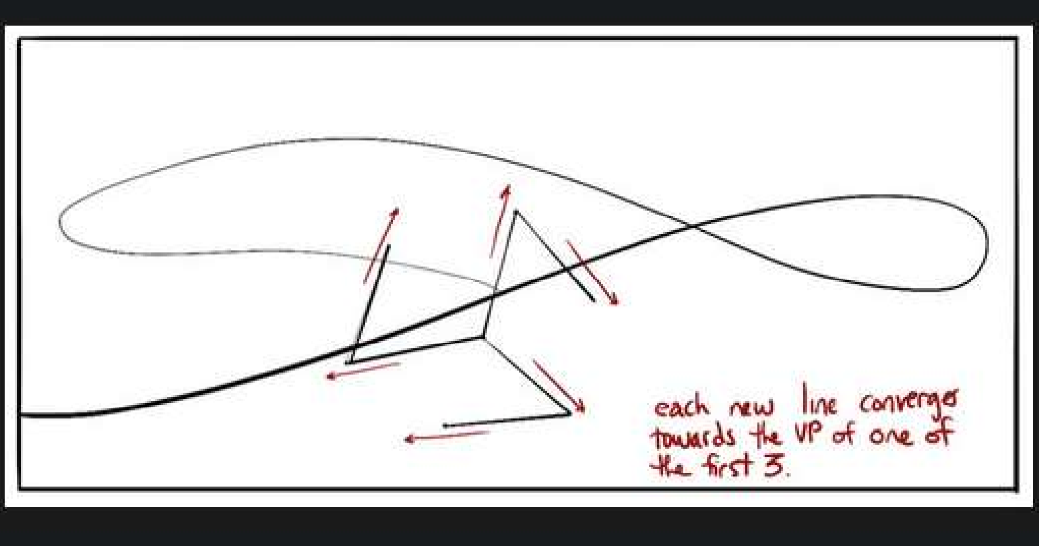
While this exercise is very much about attempting to construct freely rotated boxes in 3D space, it also introduces you to a couple of compositional concepts. To start with, we're going to draw a frame as we did for many of our previous exercises.

We're also going to draw a nice, swoopy line as you can see here. Imagine this line moves from closer up to the viewer and pushes back into the scene, getting further away. You can also draw with more pressure initially to make it a heavier stroke close up, and ease up as you move back. Alternatively, you may also want to draw it in the opposite direction - from far away, starting light, to close up, finishing up with more pressure and weight.


each line goes towards its own VP.

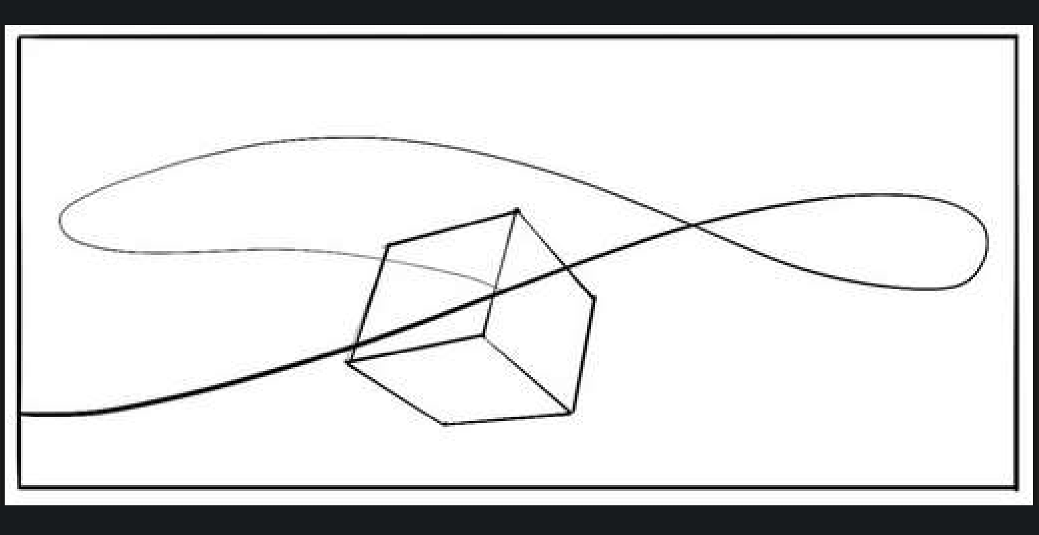
Next, we're going to start with one box. For that box, find the corner that is going to be closest to the viewer, and draw out each of the lines coming off that corner. Often this will result in a sort of "Y" shape with angles greater than 90° between each line (resulting in something we call the Y method of constructing a box), but that's not really what's important.

What matters here is that you're drawing one line belonging to each of the three sets of parallel lines that make up this box. Each line points to its own separate vanishing point.


each new line converges towards the VP of one of the first 3.

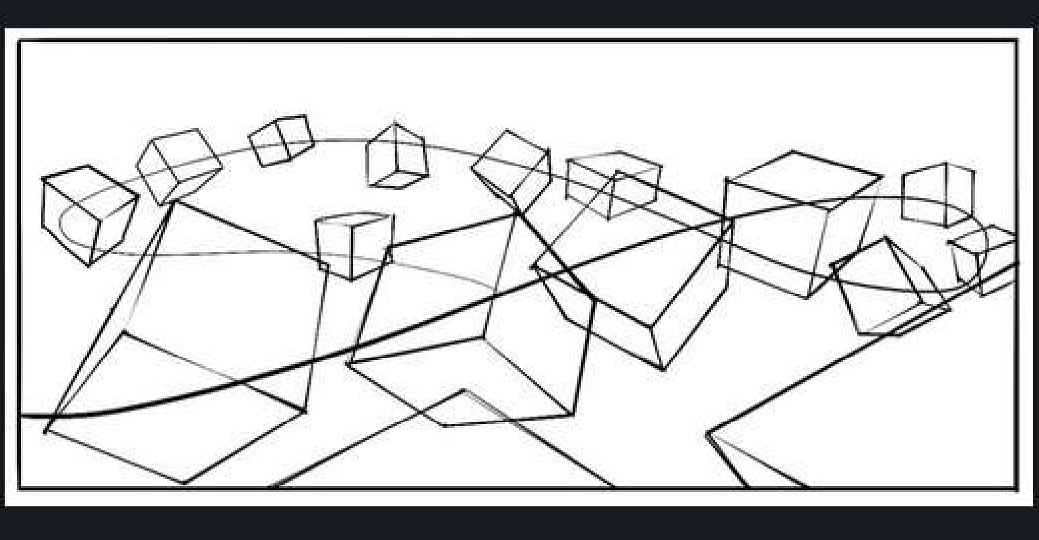
Now with one line of each set drawn, we're going to add another to each line. As you're drawing this, think about how you want each set to converge and try and think about (in rough terms) where the vanishing point is going to be for each set.

This step effectively sets in stone where the vanishing point is going to be. It'll be where the two lines present of each set converge. Now we're not going to necessarily be super accurate to this as we move forwards, but it's what we're going to strive for. You'll notice that in my example here, my estimations will be far from perfect.



Finally we finish up the last three lines for this box. The result is... workable. The convergences are far from consistent, but the act of constructing this box has forced us to think about how those lines exist in sets, where each set shares one vanishing point.

Keep in mind that the specific procedure we've used here isn't set in stone - it's about the concepts it highlights. At its core, a box is made up of three sets of parallel lines. How you come about putting those together is up to you.



Now, repeat the process many, many times over. Construct your boxes along the swoopy line you made initially, specifically making the boxes that are closer larger and those far away smaller in order to convey the depth of the scene.

One other thing I want you to avoid is applying foreshortening that is too dramatic to any of these boxes, *especially* those further behind. I explain the reason for that in these notes about foreshortening and conveying scale.

The purpose of this exercise

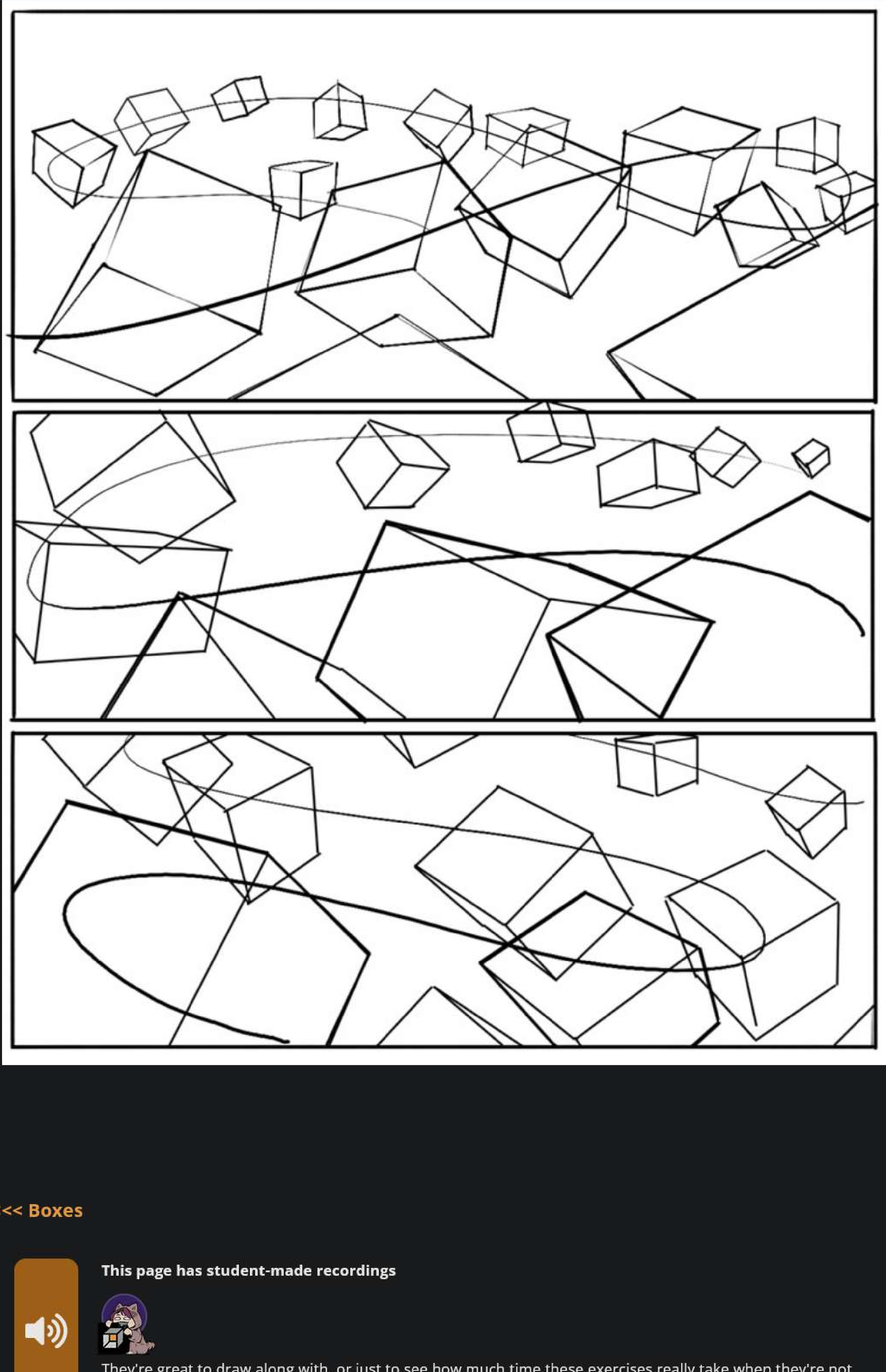
The purpose of this exercise is to throw you into the deep end of the pool without having yet taught you to swim. By diving into this exercise, you're being forced to contend with freely rotating boxes in 3D space without any real grounding of how to deal with them. There's no concrete vanishing points that you're marking out on the page, no neighbouring forms to base things off. It's more guesswork than you'll have dealt with by this point. It's actually been the pattern we've followed - gradually stripping away our rules, forcing you to rely more and more on educated guesses and intuition.

So expect to make a lot of mistakes. The point isn't to be able to nail this, but to get your gears turning as you start thinking about the fact that this is a kind of spatial problem you're facing, likely for the first time. We're exposing you to it because you likely wouldn't have really considered this sort of thing otherwise.

Example homework

So like the last exercise, it doesn't really matter if your work comes out looking like this. What's important is that you strive for it, so you're forced to start thinking about how these forms can be rotated freely in 3D space. You will struggle with it, and you're meant to.

When you're done, that'll mark the completion of this lesson. Don't worry if you had any trouble at all - it's expected, and you'll be diving into the 250 box challenge after this (once you've had your Lesson 1 homework critiqued and marked as complete).



<<< Boxes

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The Science of Deciding What You Should Draw

Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

WHAT THE HELL AM I SUPPOSED TO DRAW?!

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What Next?

Lesson 1: Lines, Ellipses and Boxes

What Next?

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So assuming you've been reading diligently (starting from lesson 0) and have followed the instructions of completing only the recommended number of pages, then you're probably wondering, "what do I do now?"

Well, the smart thing would be to get your homework reviewed. Let's say you've done that already, and want to know what your next step is going to be.

Your next step is to tackle the 250 box challenge. This exercise will take what you were introduced to in the rotated boxes and organic perspective boxes exercises and work on developing your overall grasp of, and comfort with, freely rotating forms in 3D space. The notes and video there cover techniques that will help you do this as efficiently and effectively as possible as well.

It's a tall order, but most who've gone through it have shown considerable improvement - especially those who've read through the notes and applied the error-checking approaches consistently.

And before you go, I hope you've been able to get your work reviewed by other members of the community to make sure you're still on track. You can watch me get my work reviewed by Uncomfortable, live!

He points out some mistakes I've made, and also talks about common issues he sees when critiquing others' work.

<<< Boxes: Homework

250 Box Challenge >>>

Sakura Pigma Microns

A lot of my students use these. The last time I used them was when I was in high school, and at the time I felt that they dried out pretty quickly, though I may have simply been mishandling them. As with all pens, make sure you're capping them when they're not in use, and try not to apply too much pressure. You really only need to be touching the page, not mashing your pen into it.

In terms of line weight, the sizes are pretty weird. 08 corresponds to 0.5mm, which is what I recommend for the drawabox lessons, whereas 05 corresponds to 0.45mm, which is pretty close and can also be used.

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VIEW HOMEWORK SUBMISSIONS

SUBMIT HOMEWORK FOR REVIEW

The Challenge
- Drawing boxes
- Drawing through your forms
- Checking our convergences
- Do not extend in the wrong direction
- Easy way to extend correctly
- Line weight
- Line weight to clarify overlaps
- Foreshortening
- Width of opposite ends
- Important reminders
- Assignment

Additional Box Exercises
- Boxes on a string
- Subdividing boxes

250 Box Challenge

The Challenge

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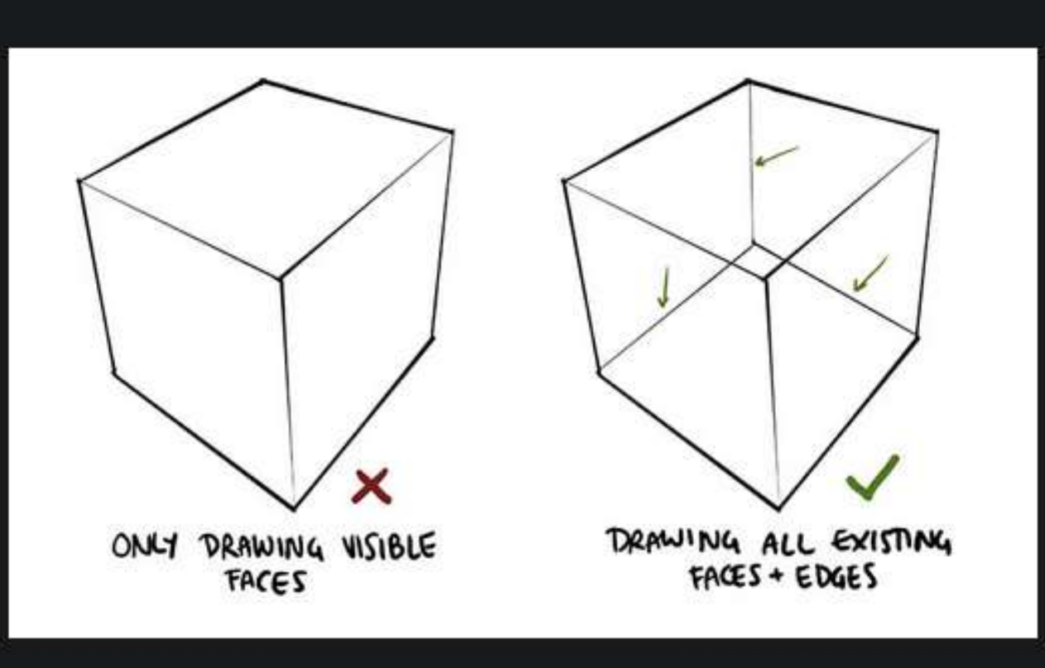
Drawing boxes

Welcome to the crucible. If you haven't completed lesson 1 yet, you should go and do that first.

This exercise is probably what Drawabox is best known for (and perhaps most reviled). Which is kind of unfortunate, given that it's a pretty basic exercise. As one might imagine, you draw a box - then do it again another 249 times.

I cover it (partially) in my notes about the organic perspective exercise, but before we get to drawing, I don't want you leaving thinking that this is all there is to the exercise. Some people rush off without getting all the instructions, and fail to make the most of the arduous task. There's a little more to it, which is explained in the video as well as below.

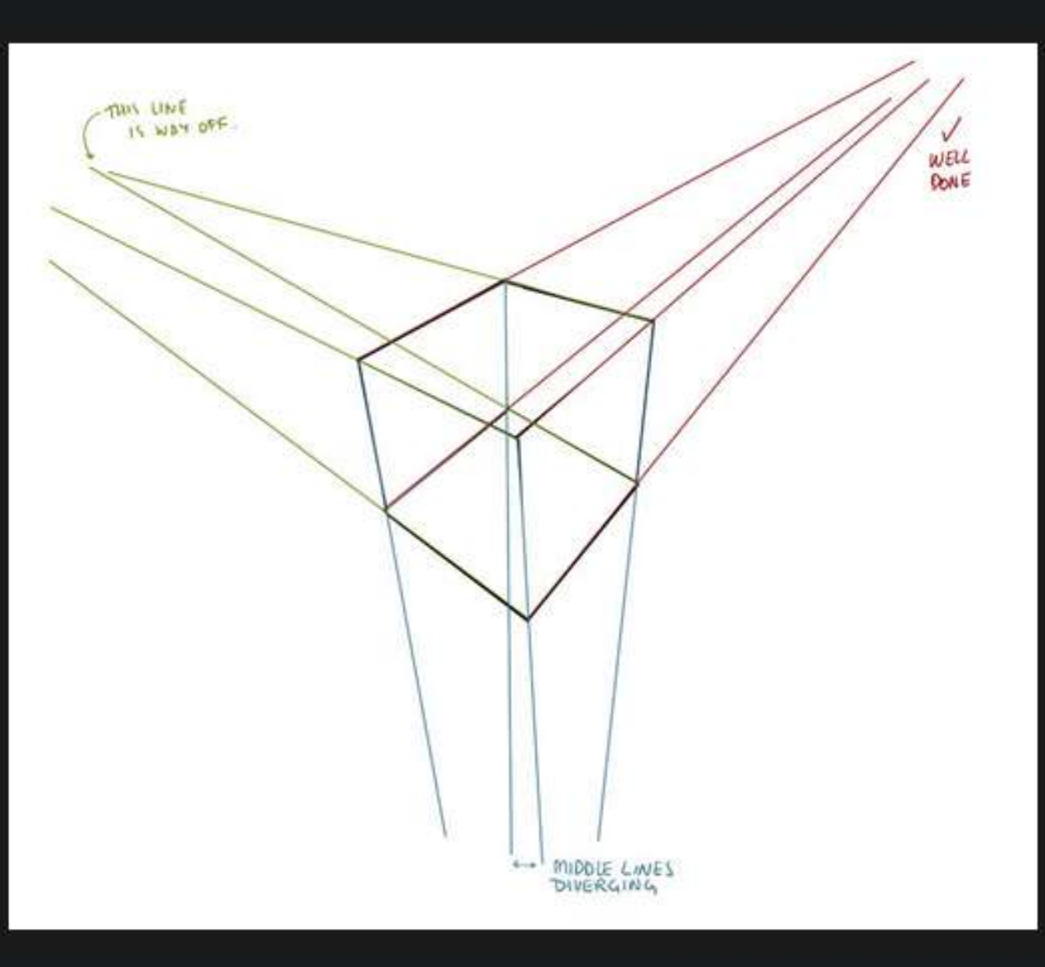

ONLY DRAWING VISIBLE FACES
DRAWING ALL EXISTING FACES + EDGES

Drawing through your forms

This exercise is all about developing your understanding of 3D space and how forms can be manipulated within it. In order to do this most effectively, we can't be thinking about what we draw as being lines on a flat page, or simple flat shapes. We need to work towards understanding how each form sits in 3D space.

The first step towards this is to draw through our forms. That is, drawing all the edges, including those that we cannot see. Think of it like you have x-ray vision. We already did some of this in lesson 1.

Doing this forces us to understand to a much greater degree how the forms we draw exist in space. You may find it difficult to do so, and may find that often times the "back corner" fails to fit with the rest. This is completely normal. As we draw a box, we regularly make small mistakes in our angles and trajectories of our edges. We compensate for them as we continue to build out our box. This accumulation of mistakes always falls on the lines that have yet to be drawn, and if we're not drawing through them, it becomes quite easy to get by without having to deal with the issues present. Once we draw that back corner however, we're forced to come to terms with our blunders.



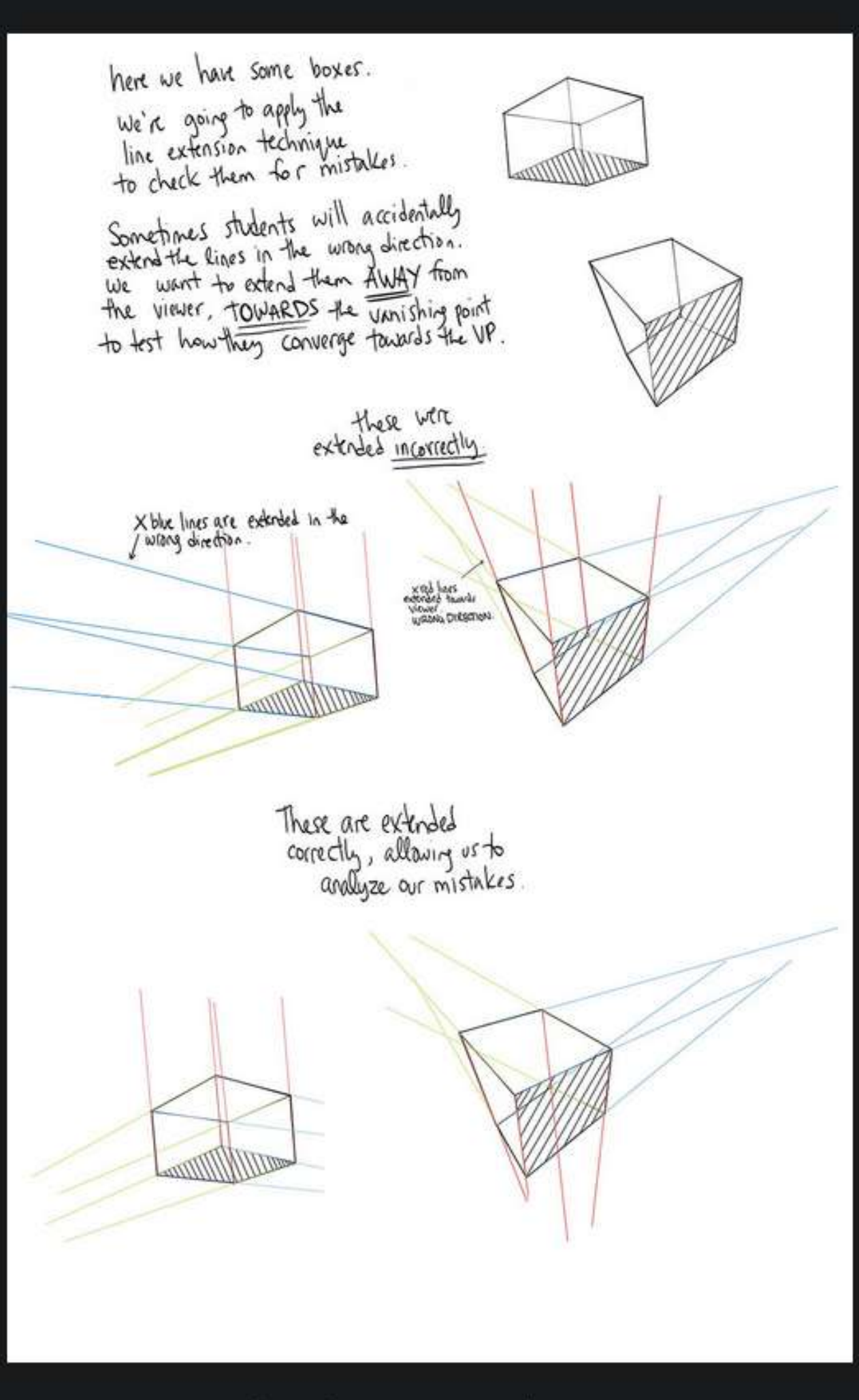
Checking our convergences

Noticing and identifying our mistakes is a major part of the learning process, and sometimes it's not necessarily something we can pick up on easily with the naked eye. For this reason, I recommend that you apply the following technique to each and every box you draw for this challenge.

Once you've completed drawing a page of boxes, grab a pen of a different colour and a ruler and start extending your lines back in space - meaning, towards their implied vanishing points. You don't have to extend it all the way (usually this will be impossible due to vanishing points falling way off the page), but extend them as much as you reasonably can.

By looking at how a given set of parallel lines (that is, a set that is meant to converge towards a single vanishing point) actually behaves, we can identify patterns in our mistakes.

Apply the extensions upon the completion of each page. Not after each box, and not after you're done all 250.


here we have some boxes. We're going to apply the line extension technique to check them for mistakes.
Sometimes students will accidentally extend the lines in the wrong direction. We want to extend them AWAY from the viewer, TOWARDS the vanishing point to test how they converge towards the VP.
these were extended incorrectly.
X blue lines are extended in the wrong direction.
These are extended correctly, allowing us to analyze our mistakes.

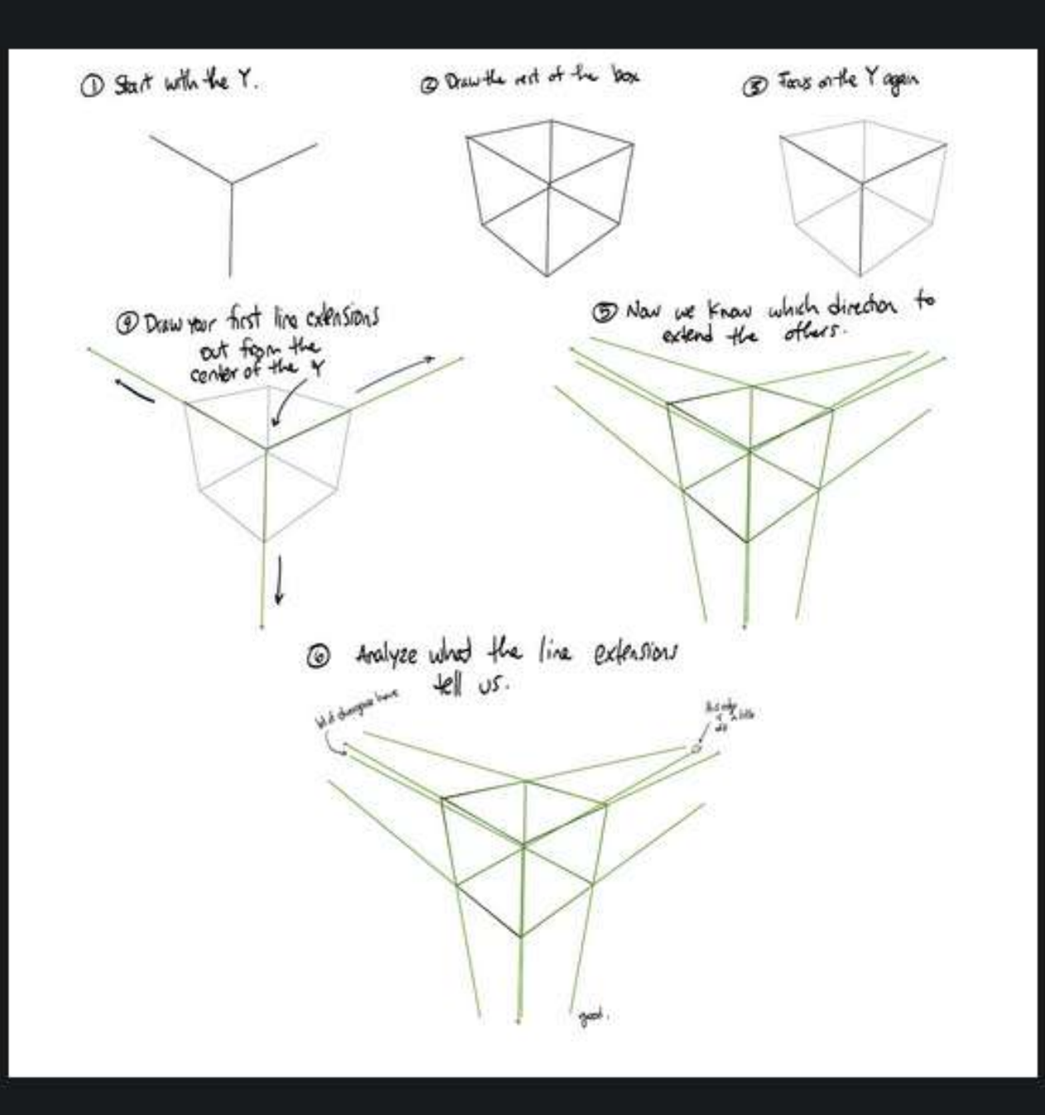
Do not extend in the wrong direction

As there's a lot to take in, sometimes students move forward without fully understanding what the line extension method really means, and as a result, extend their lines in the wrong direction. This gives them no useful information, leaving them uncertain and confused.

Our lines must be extended AWAY from the viewer, towards the implied vanishing point, never towards the viewer. Make sure that when you are about to extend your lines, that you think about which side of the box is pointing towards you, the viewer.

Sometimes students will feel that they need to extend their lines in the direction that they converge, but this is incorrect. Sometimes, because we have drawn the initial box incorrectly, our lines will diverge as they move farther away from us. This is the kind of mistake we are trying to identify by extending the lines.

Since we apply this technique *after* we've completed a full page of boxes, it may be a little difficult to identify which side of the box is which (since we're drawing through our boxes). In order to avoid this, you can fill one of the faces pointing towards the viewer with tight hatching (as shown in this example, as well as in the next section) when you draw the box itself. That way, when you come back to it, its orientation in space will be much clearer.

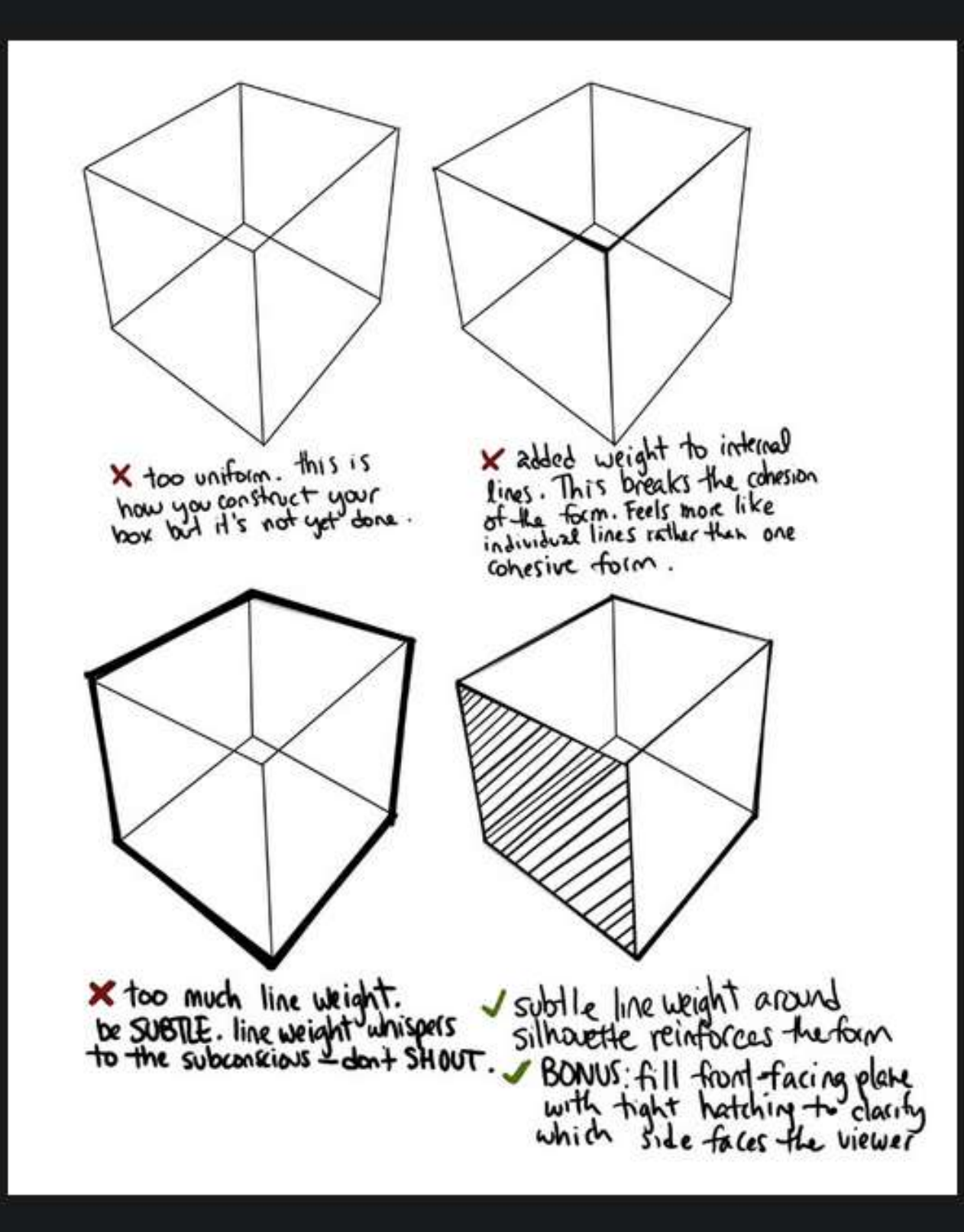

① Start with the Y.
② Draw the rest of the box
③ Focus on the Y again
④ Draw your first line extensions out from the center of the Y
⑤ Now we know which direction to extend the others.
⑥ Analyze what the line extension tell us.
good.

Easy way to extend correctly

If the section above on line extension direction isn't really making sense to you right now, don't worry. Here's a handy approach to ensuring that you're extending them correctly.

It all works off the Y method we introduce in the video, where the Y we start with defines 3 edges that meet at the corner closest to the viewer.

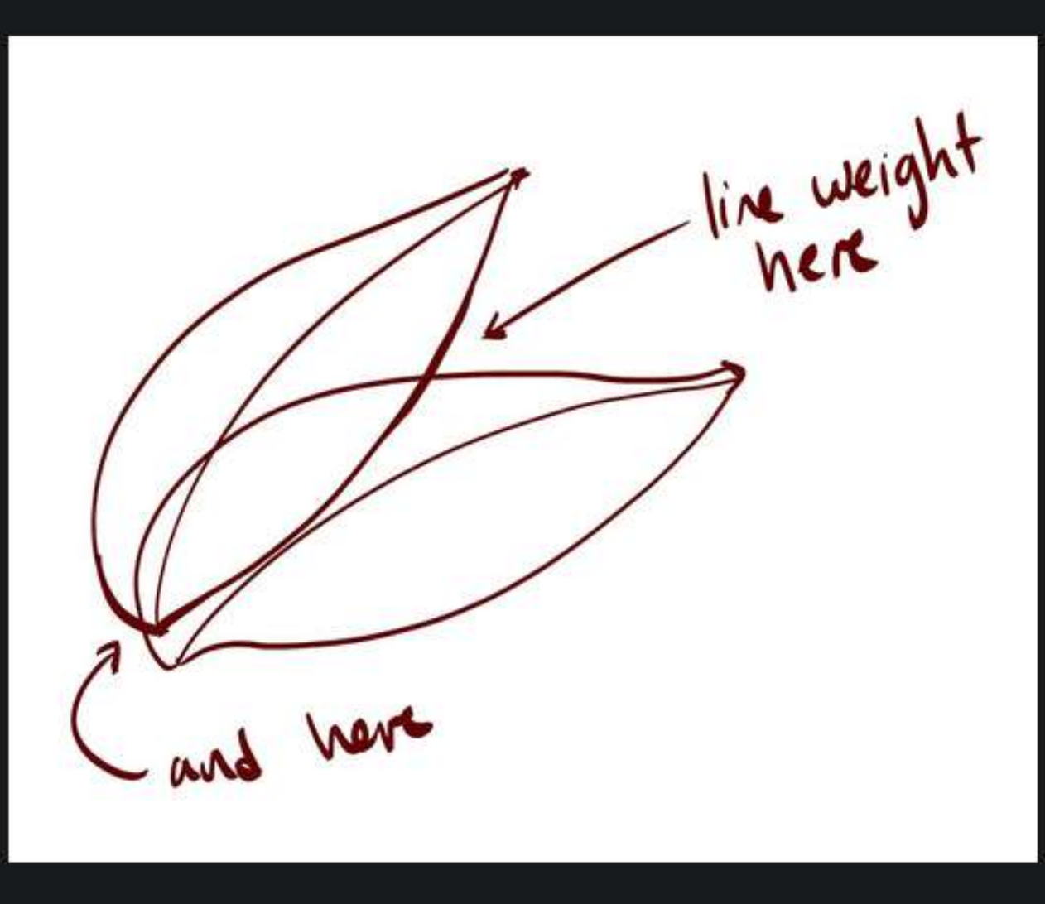
If you start by extending along each "arm" of the Y from that central point, you'll guarantee that you're extending them in the right direction. That'll give you one line extension for each set of edges, which will tell you how to extend the other edges of each set.


✗ too uniform. this is how you construct your box but it's not yet done.
✗ added weight to internal lines. This breaks the cohesion of the form. Feels more like individual lines rather than one cohesive form.
✗ too much line weight. be SUBTLE. line weight whispers to the subconscious - don't SHOUT.
✓ subtle line weight around silhouette reinforces the form
✓ BONUS: fill front-facing plane with tight hatching to clarify which side faces the viewer

Line weight

One technique that is extremely useful both in reinforcing the illusion of solidity in our forms and in helping to organize our linework and clarify how different forms overlap is the use of line weight. Basically, it means making certain lines thicker than others (by going back over them with a confident, planned stroke).

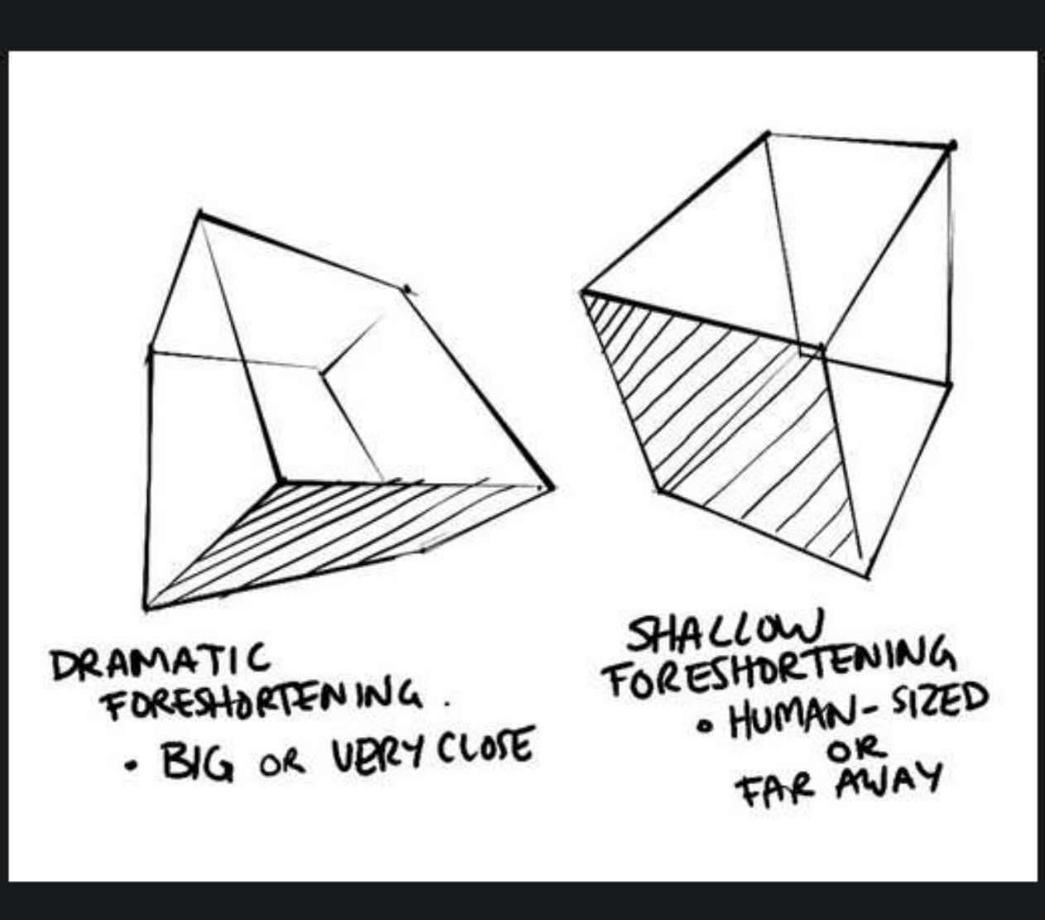
When adding line weight to a box, there are a few things to remember. Weight is relative. You're not going in to make one line extremely bold on its own. You're going in to make it **subtly** thicker than another. This doesn't require the addition of much extra thickness, just enough to set it apart. Our subconscious will pick up on this difference even if our eyes don't immediately, and will understand the kind of hierarchy this is creating.



Line weight to clarify overlaps

In this challenge, you can practice adding line weight (which involves going back over the line, like in the super imposed lines exercise, and using the ghosting method to ensure a confident stroke) along the boxes' silhouettes, but when we get into drawing actual objects (Lesson 3 onwards), we'll use it in a more limited fashion - specifically as a tool to help clarify how different forms overlap one another, restricting it to the specific areas where those overlaps occur. You can see this demonstrated with these two overlapping leaves.

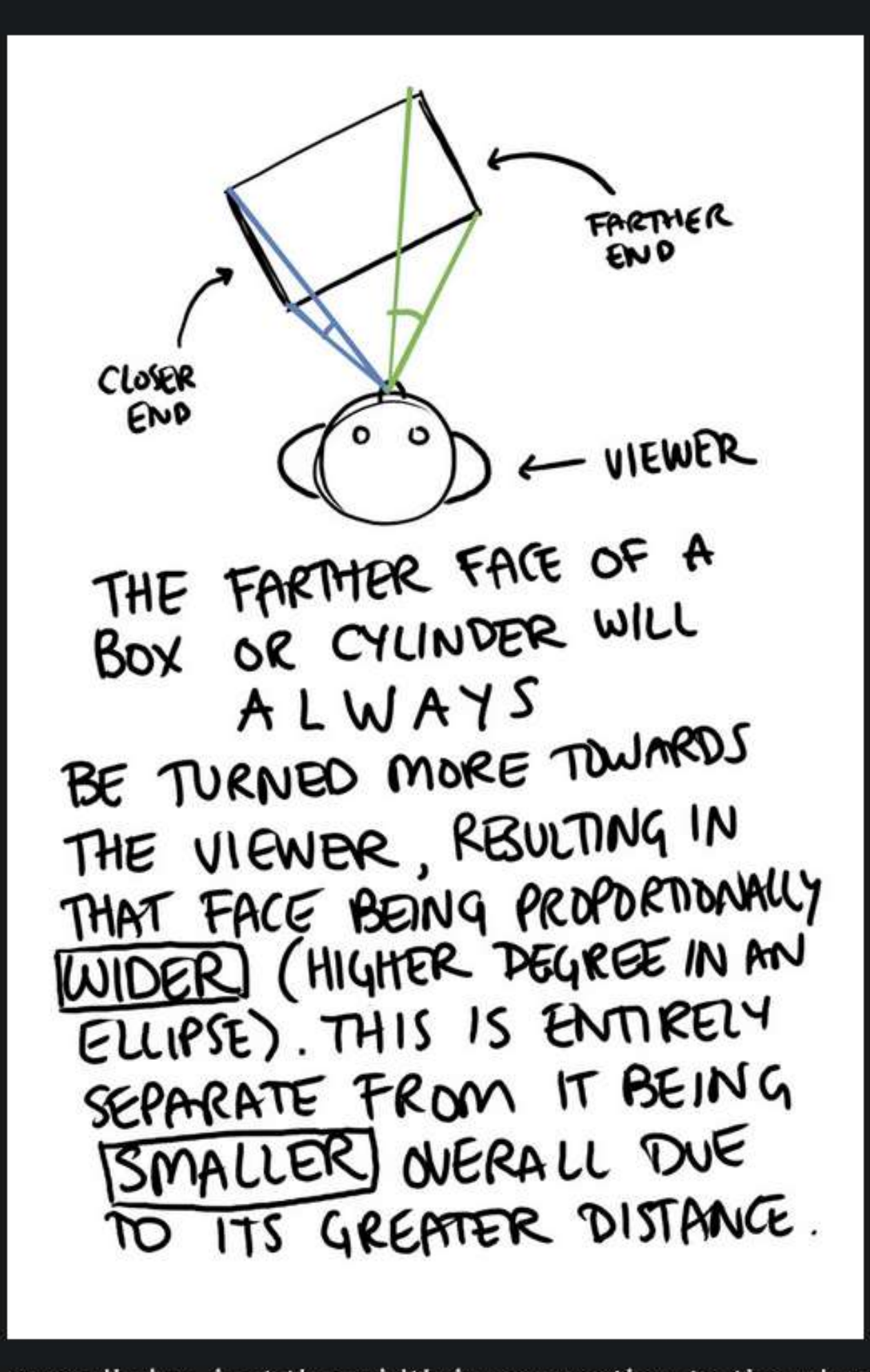
Don't worry about this right now - I just wanted to point out that, as with everything we learn here, line weight is a tool, and it is important to always think about what we're meant to achieve through its use, rather than applying it blindly and without purpose or clear intent.



Foreshortening

As explained in the extra box notes of lesson 1, a box with a lot of dramatic, rapid foreshortening, with its vanishing points positioned close to the form itself, is going to suggest a very large scale or an object that is right up to the viewer's eye. Alternatively, shallower foreshortening with far-off vanishing points and minimal convergence towards them is going to imply an object that is either at a more human scale, or simply very far away.

I want you to make sure you practice both of these, perhaps with a bit more of a lean towards the shallower foreshortening. These will be especially relevant in later lessons as we use boxes to construct more complex objects, due to most things we're drawing not being so immensely large. Still, it is valuable to get used to both situations, as they both pose different kinds of challenges.



THE FARTHER FACE OF A BOX OR CYLINDER WILL ALWAYS BE TURNED MORE TOWARDS THE VIEWER, RESULTING IN THAT FACE BEING PROPORTIONALLY WIDER (HIGHER DEGREE IN AN ELLIPSE). THIS IS ENTIRELY SEPARATE FROM IT BEING SMALLER OVERALL DUE TO ITS GREATER DISTANCE.

Width of opposite ends

This was initially pointed out in the cylinder challenge, but it is entirely relevant here as well. As explained back in lesson 1's ellipses, if you have a plane in 3D space, and you turn that plane slowly to face away from you, it will steadily get narrower and narrower. In terms of an ellipse enclosed within that plane, this is the degree of that ellipse gradually decreasing.

When we have a box floating in 3D space, unless you're looking right down the barrel of one of its faces, either end of this box is going to be sitting at a slightly different orientation relative to the viewer. That is, the angle of the planes' orientation in space will be different. The more space there is between these faces, the more different that orientation will be. This goes for any of the three pairs of faces in a box.

As a result, the *farther* end of the box is always going to be wider (and therefore be oriented more towards the viewer) than the *closer* end. This is an important point to keep in mind when thinking of how your boxes fit in 3D space.

Generally speaking, this idea of the proportional width (we're not talking about overall size, just the width in proportion to the plane's scale) being related to a flat surface's orientation in space is pretty important, and will come up in cylinders as well as in any kind of cross-section of a form.

Important reminders

Some mistakes still come up frequently amongst students, so this reminder will hopefully keep you on the right track:

- **Do not draw your boxes with lines that are actually parallel on the page**. Back in Lesson 1 we talked about how a vanishing point can go to "infinity", eliminating the convergences of the lines it governs. This is not something we can just arbitrarily do for everything - it only happens when that given set of lines runs perpendicular to the viewer's angle of sight. Since we're drawing boxes that are freely and randomly rotated in space, **make sure *all* of your boxes' lines converge**, whether gradually and slightly or quickly and dramatically.
- **It is extremely important that you ensure that your line extensions point *away* from the viewer**, as their purpose is to help us analyze how those lines behave (whether they converge or diverge) as they move farther away. If they're extended towards the viewer, then it kind of renders the line extension analysis pointless, since it doesn't tell us how we can improve our next page of boxes.
- **Don't worry about the back corner being off**. The back corner is a distraction - a symptom of the individual sets of lines not converging consistently. This is not something you're going to master here, so that back corner will always be at least a little off, and if all you're focusing on is the back corner, it's going to feel like you're not making progress, when in fact you are. Focus on the sets of lines, and making them converge as consistently as you can.
- **Vary your boxes**. Don't just draw the same box over and over. Vary its orientation, **its rate of foreshortening/convergence**, and so on.
- **Number your boxes**. It helps us immensely in case the pages are uploaded out of order (which happens frequently since imgur is kind of a pain about that), and also allows us to call out specific boxes easily in our critiques.

Assignment

In order to complete this challenge, you must draw the following, in either fineliner/felt tip pen (ideally) or ballpoint pen:

- 250 boxes, drawing through each one, and applying the line extension method to check for errors after completing each page (not after each box).

Try to stick to 5-6 boxes per page (assuming you're working with the recommended A4, 8.5"x11" sheets of paper), in order to give yourself enough room to draw each box at a reasonable size while also leaving some space to extend your lines. Also, if you're having trouble thinking up orientations for your initial 'Y', you may use this tool, which was created by our own community member, Eric Na in your first 100 boxes to get comfortable. After that however, I'd like you to create your own arbitrary Ys.

Contour Lines, Texture and Construction >>>

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

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Staedtler Pigment Liners

These are what I use when doing these exercises. They usually run somewhere in the middle of the price/quality range, and are often sold in sets of different line weights - remember that for the Drawabox lessons, we only really use the 0.5s, so try and find sets that sell only one size.

Alternatively, if at all possible, going to an art supply store and buying the pens in person is often better because they'll generally sell them individually and allow you to test them out before you buy (to weed out any duds).

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Lesson 2: Contour Lines, Texture and Construction

Thinking in 3D

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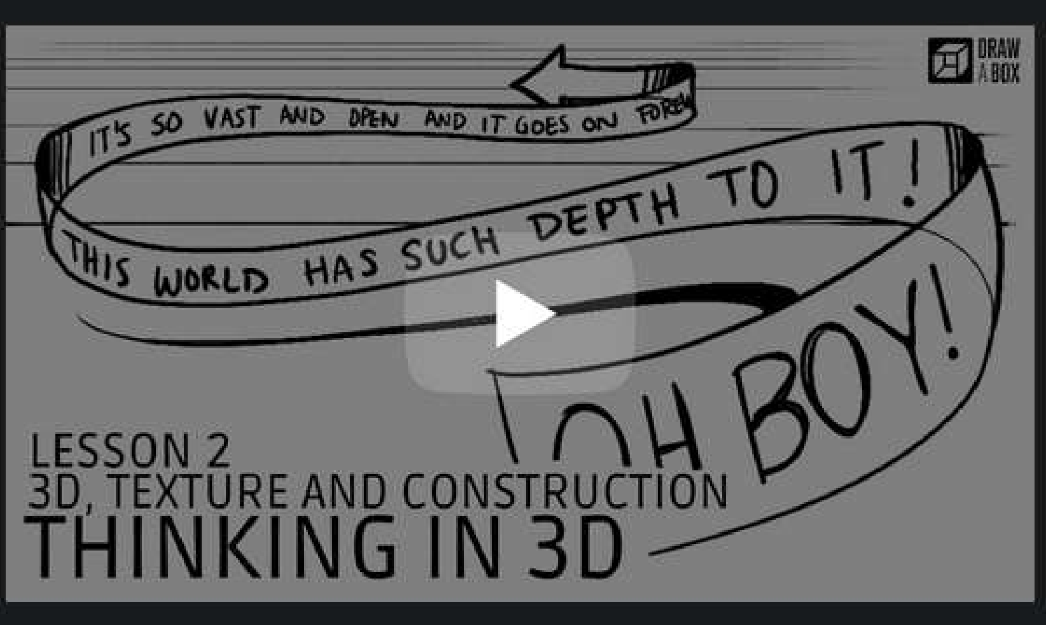
Box Challenge

If you haven't yet completed the 250 box challenge, make sure you tackle that first. Not only will it help further develop your grasp of how to construct forms freely rotated in 3D space, it will also help you develop the kind of discipline and patience that will serve you throughout this entire course.

Keep in mind that if you're on the 'official critique' track, you *must* get your 250 box challenge marked as complete before moving onto this lesson. And of course, be sure to balance it with the 50% rule from Lesson 0.


IT'S SO VAST AND OPEN AND IT GOES ON FOREV
THIS WORLD HAS SUCH DEPTH TO IT!
OH BOY!
LESSON 2
3D, TEXTURE AND CONSTRUCTION
THINKING IN 3D
DRAW A BOX

The great conspiracy

When we start out, we know exactly what we're doing when it comes to drawing. We're taking a pen, a pencil, a stylus or whatever else, and we're making marks on something very, very... flat. We're not fools - we know that's exactly what we're doing, and we're very much in on the great conspiracy.

What conspiracy? The one where we fool our audience into thinking everything we draw is in fact 3D. That's what perspective is all about, right? Tips and tricks to fool those idiots and rubes into believing in something that isn't real?

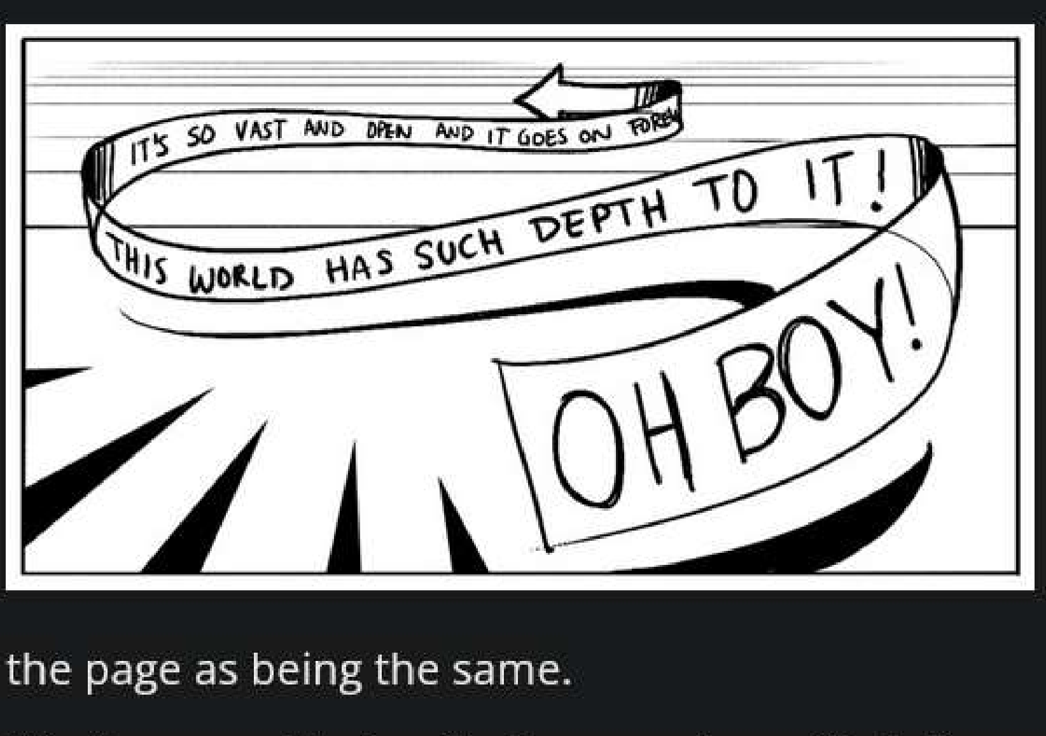
Telling a convincing lie

Unfortunately, we tend to be too smart for our own good. The fact that we understand that what we're drawing is just a series of marks on a flat page is something we communicate to the viewer through subtle properties of the actual marks we put down. To put it simply - we're subconsciously convincing the viewer that none of this is real.

The trick is more about learning to lie effectively. That's what these drawings are - they're illusions created to trick the viewer into believing in something that isn't actually there. The *best* way to tell a lie isn't to be extra clever, but rather to be a fool. When we believe in the lie we're selling, everything we say and do will reinforce the lie, whether we're conscious of it or not. It's this wealth of information all pointing to the impossible, and the fact that it all does it in a cohesive, consistent manner, that makes this impossible thing believable.

Aside from the basic technical skills covered in lesson 1, that's ultimately what Drawabox is about. It's about taking students who are all too aware of what they're doing and **gradually** teaching them to believe in fairy tales. It's not something that just happens, it's not a truth that'll sink in the moment you're told - because there's no truth to it at all. It's all a lie.

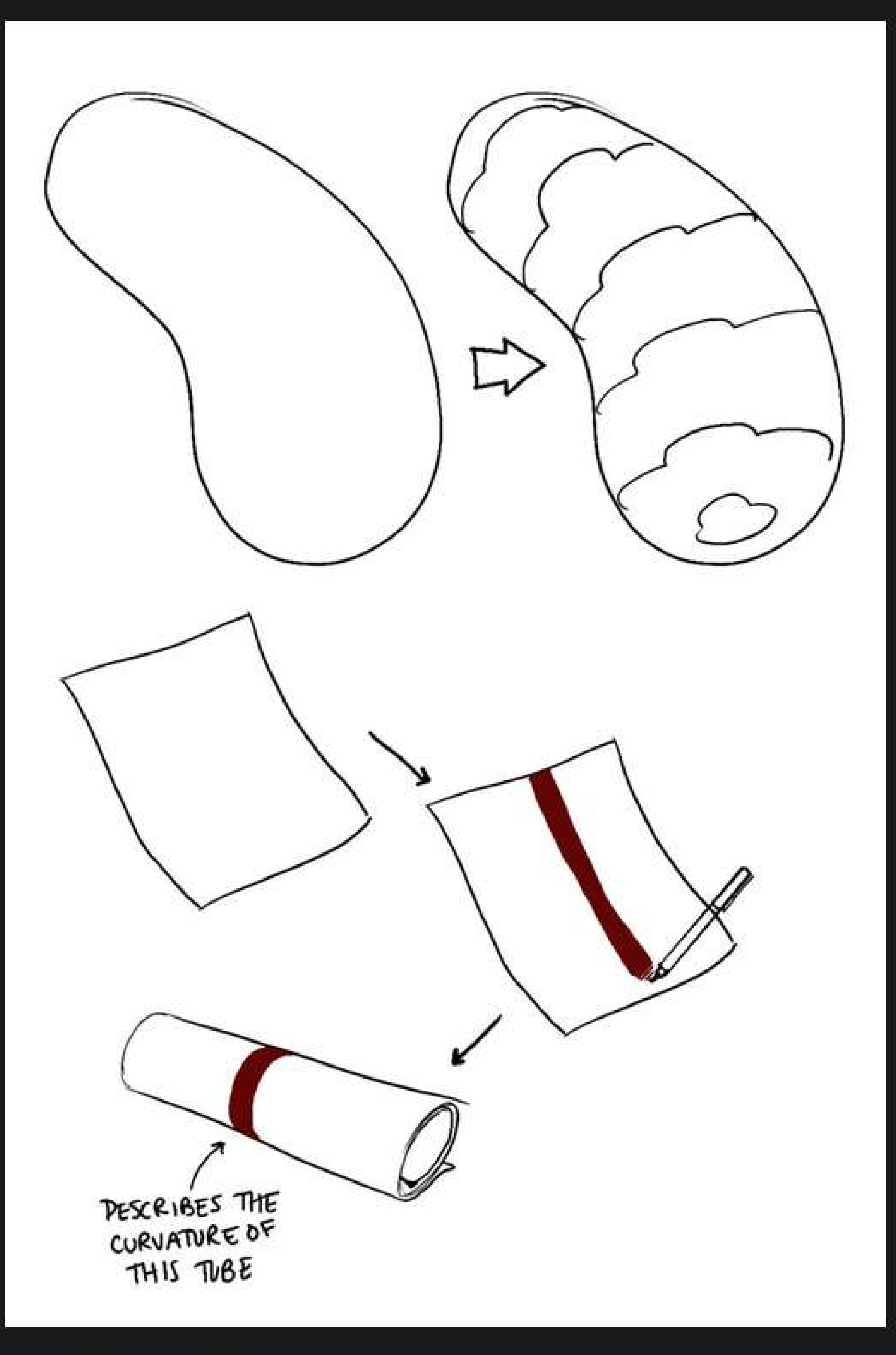
So when you move through the exercises in this lesson and those moving forward (*especially* those where we're drawing actual objects like plants, insects, animals, vehicles, etc.) we're *not* learning to draw those objects. We're using them as a theme for exercises targeted at making you understand how everything you draw is three dimensional, solid, tangible and **real**. This is much more fundamental than learning how to draw a tiger or a porsche.


IT'S SO VAST AND OPEN AND IT GOES ON FOREV
THIS WORLD HAS SUCH DEPTH TO IT!
OH BOY!

Exploring a 3D space

The first thing we need to get used to is the idea that the space we're drawing in is no longer defined by the flat piece of paper. This page is instead a *window*, one that looks out onto a vast three dimensional world that continues on even where you cannot see it. When you look out a window of a building, you know full well that what you're able to see is not the entirety of what exists out there. Think of the page as being the same.

What we need to familiarize ourselves with is the concept of the third dimension - that of depth - and the idea that objects are not only going to be to the left and to the right, or above and below. They will also be farther away from us, as well as closer. Perspective comes into play here, with the simplified rules such as objects that are closer appearing larger, and those farther away appearing smaller. There's also foreshortening - those that are very close will have more dramatic foreshortening, and those farther away will themselves flatten out with foreshortening that is shallower and more gradual.


DESCRIBES THE CURVATURE OF THIS TUBE

Contour lines

Now that we've discussed exploring the entirety of the three dimensions available to us, let's look at the objects that can exist within space - more specifically, their surfaces.

Contour lines are the marks that run along the surface of an object. In doing so, they provide our eyes and brain with valuable information describing just how those surfaces themselves flow through space.

For example, let's imagine that inside of our 3D world, there exists a piece of paper, and on that piece of paper, there has been made a single straight line down its length. The paper is flat and straight, so the line still reads as visually being straight. But what if we were to take that piece of paper and rolled it up?

Now that line as we see it would be curved, wrapping faithfully around the cylinder we've created and describing to us the transformation that piece of paper has undertaken, from being flat to cylindrical. That is what a contour line does.

Not only does it provide the viewer's brain with additional information to help understand what it is looking at, but it also helps us as we're drawing to better understand how these forms and surfaces exist in three dimensional space. That ultimately comes back to helping us believe in the lie we're trying to create.

This also means that every single mark that exists on a surface can also work against us. We are in full control of which marks go where, so we could absolutely draw a line that appears straight on the surface of a cylinder, and it would immediately ruin the illusion by making the cylinder read as flat.

Homework and exercises

Every Drawabox lesson consists of lecture content and exercises that are assigned as homework. It's best to complete this homework before moving onto the next section. As this lesson consists of three sections (thinking in 3D, texture, construction), it is best that you **only submit your work for review when you've completed all three**.

The homework assignment for this section is as follows:

- 2 filled pages of the Organic Arrows exercise
- 2 filled pages of the Organic Forms with Contour Lines exercise (1 page of contour ellipses, 1 page of contour curves)

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here.

Texture and Detail >>>

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

Sakura Pigma Microns

A lot of my students use these. The last time I used them was when I was in high school, and at the time I felt that they dried out pretty quickly, though I may have simply been mishandling them. As with all pens, make sure you're capping them when they're not in use, and try not to apply too much pressure. You really only need to be touching the page, not mashing your pen into it.

In terms of line weight, the sizes are pretty weird. 08 corresponds to 0.5mm, which is what I recommend for the drawabox lessons, whereas 05 corresponds to 0.45mm, which is pretty close and can also be used.

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Lesson 2: Contour Lines, Texture and Construction

Organic Arrows

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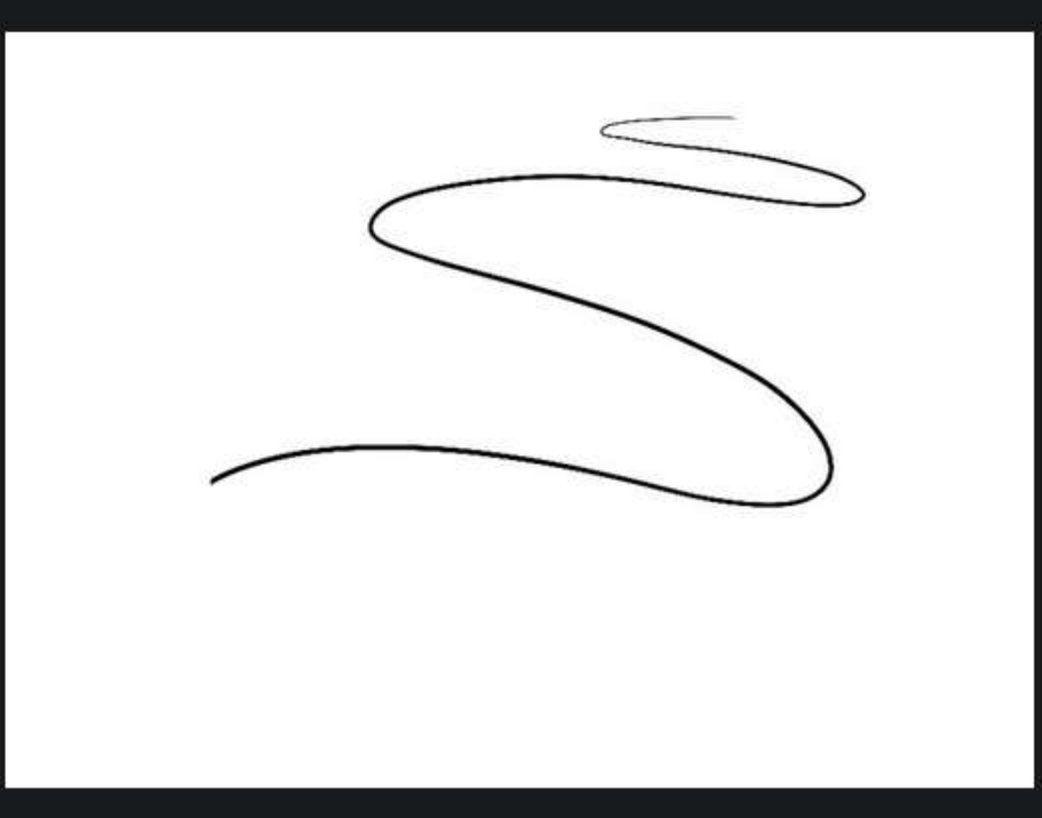
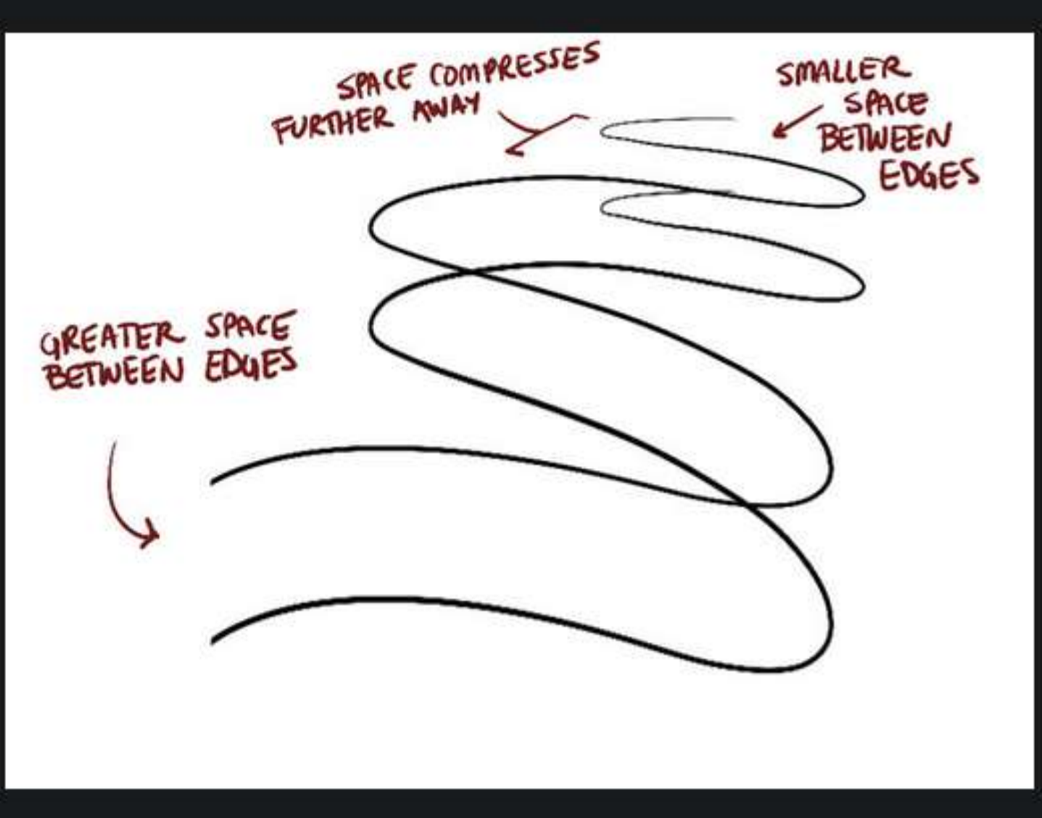
DRAW A BOX
LESSON 2
ORGANIC FORMS, CONTOUR LINES, DISSECTIONS AND FORM INTERSECTIONS
ORGANIC ARROWS

This exercise is all about exploring the bounds of all three dimensions of space, and reinforcing the idea that you're not creating things on a flat piece of paper - your page is a window into a vast 3D world with breadth, height and depth to it.

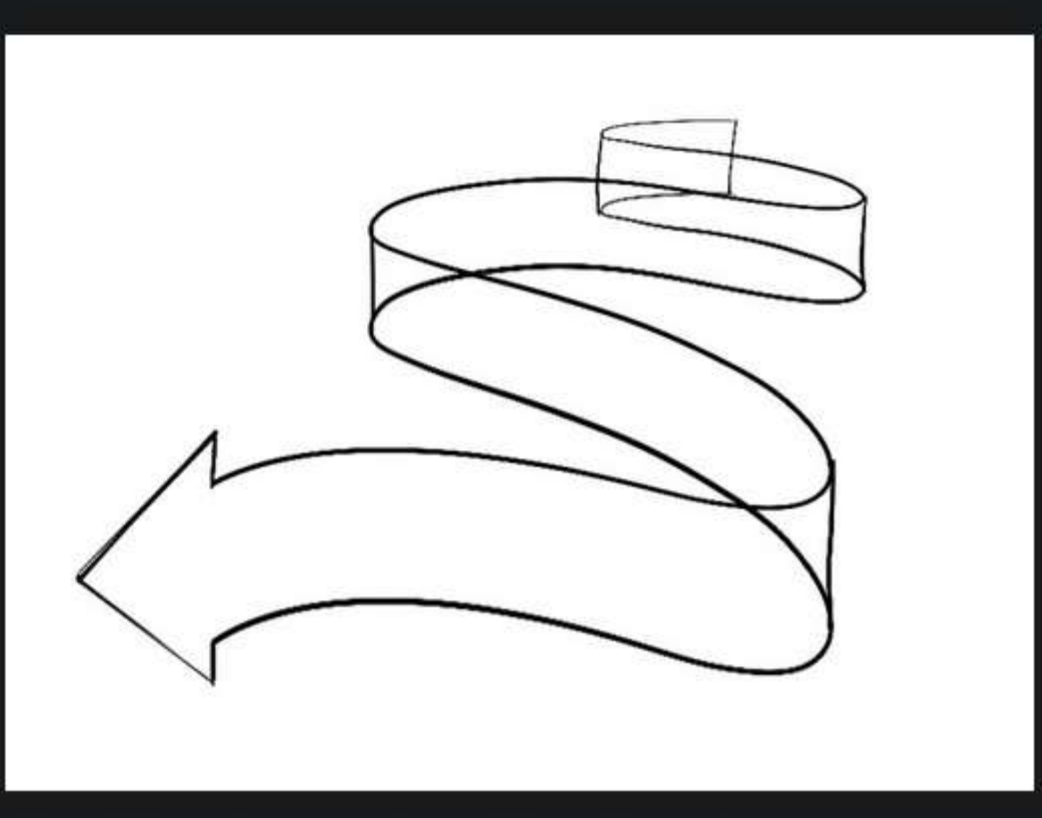


Start off by drawing a curve on the page. You may want to practice these a bit on their own as well. Try to draw a curve that bends and turns a little. S-curves are generally pretty good. Put yourself in the mindset of drawing in 3D space - your curve isn't simply sitting on a flat page, it's travelling through the depth of it as well.

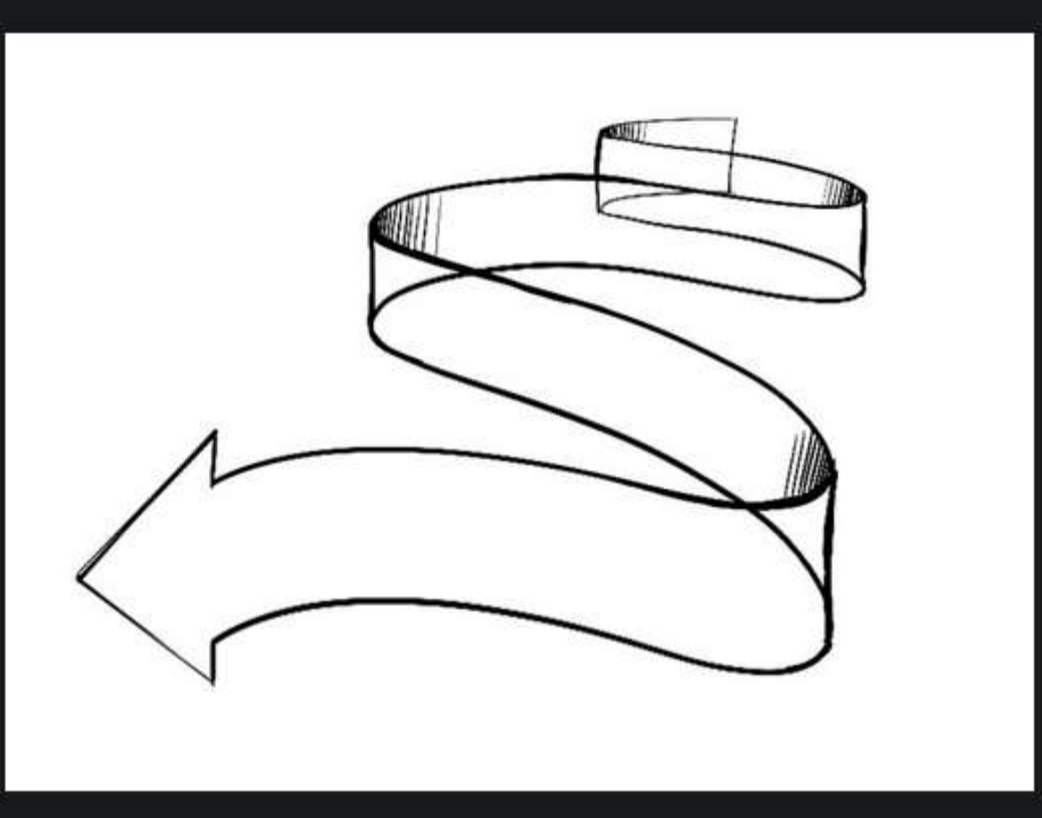

SPACE COMPRESSES FURTHER AWAY
SMALLER SPACE BETWEEN EDGES
GREATER SPACE BETWEEN EDGES

Next, draw the same curve a little below it. This can get tricky, since it's quite difficult to replicate an identical curve. You may want to build this in segments, but make sure that these flow smoothly and flow directly into one another.

Also, try and consider perspective - the space farther towards the back end of the arrow is going to be more compressed than the space up front, so all of the distances get a bit smushed. The arrow's width is going to be smaller back there, and even the space between different lengths of the arrow are going to have less space between them.



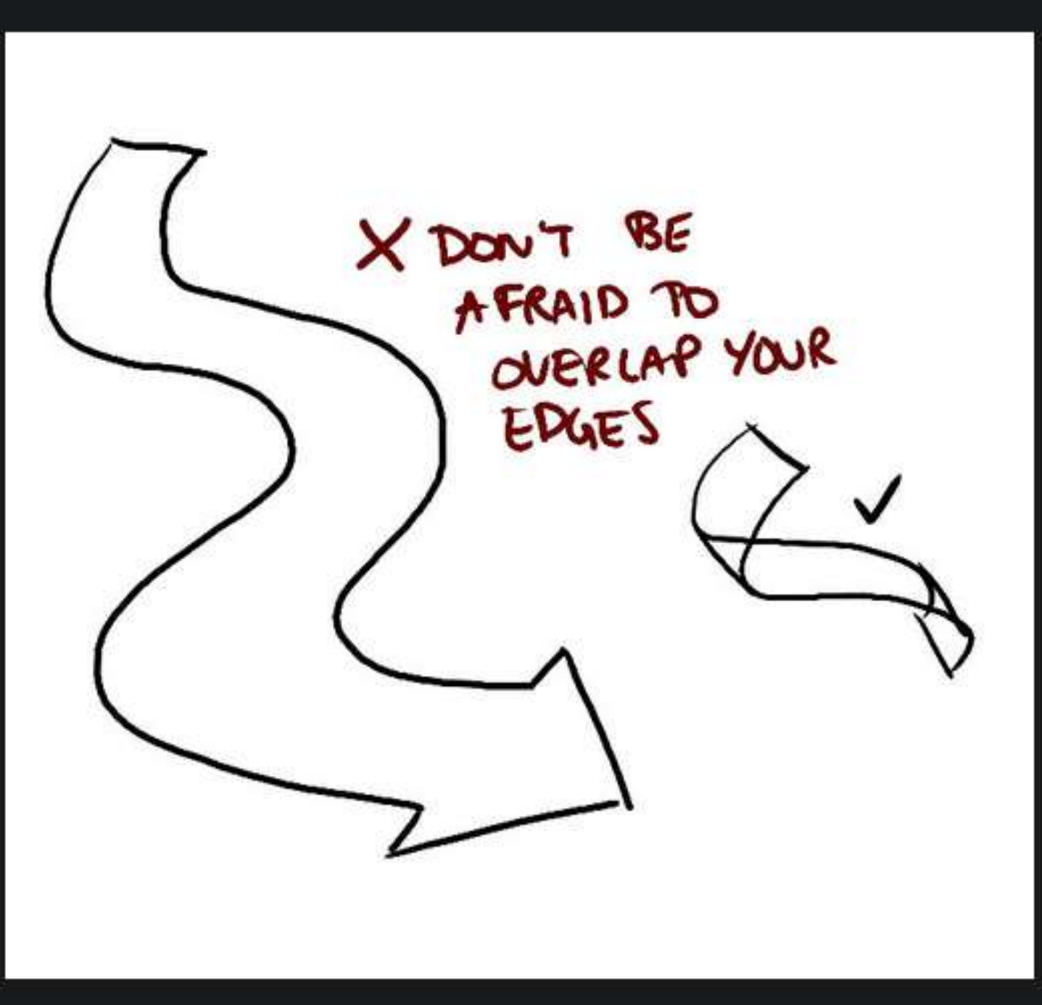
Now, we connect them and add an arrow head at one of the ends. Fairly straight forward.



Finally, add a little bit of shading at the bends, and reinforce your overlaps with a bit of extra line weight. A good rule of thumb for applying line weight at overlapping points is that the line that crosses on top gets the thicker treatment, to establish its dominance. Don't go overboard with this though, just make it a little bit thicker. Be subtle.

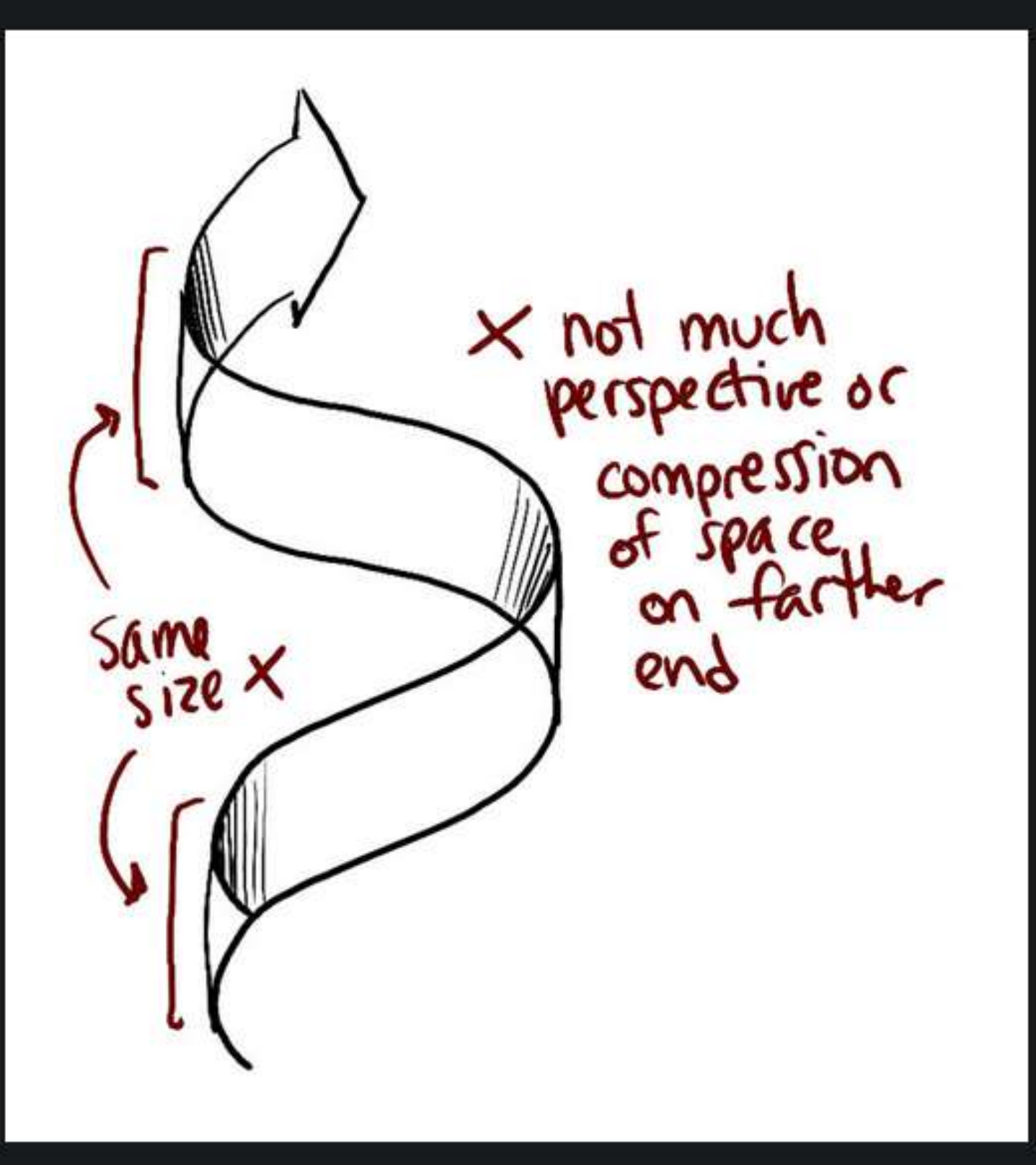
The purpose of this exercise

This exercise is all about familiarizing yourself with all three dimensions of space, and getting used to plunging into the depth of the scene, rather than sticking to just the space defined by the page itself.


X DON'T BE AFRAID TO OVERLAP YOUR EDGES
✓

Mistake: Being afraid to let your edges overlap

Sometimes students are a little afraid at first about letting their edges overlap. This is going to make your arrows look very flat, and is part of getting stuck thinking as though you're working in the space defined by the page, rather than a three dimensional world where your arrows are free to twist and turn.


X not much perspective or compression of space on farther end
same size X

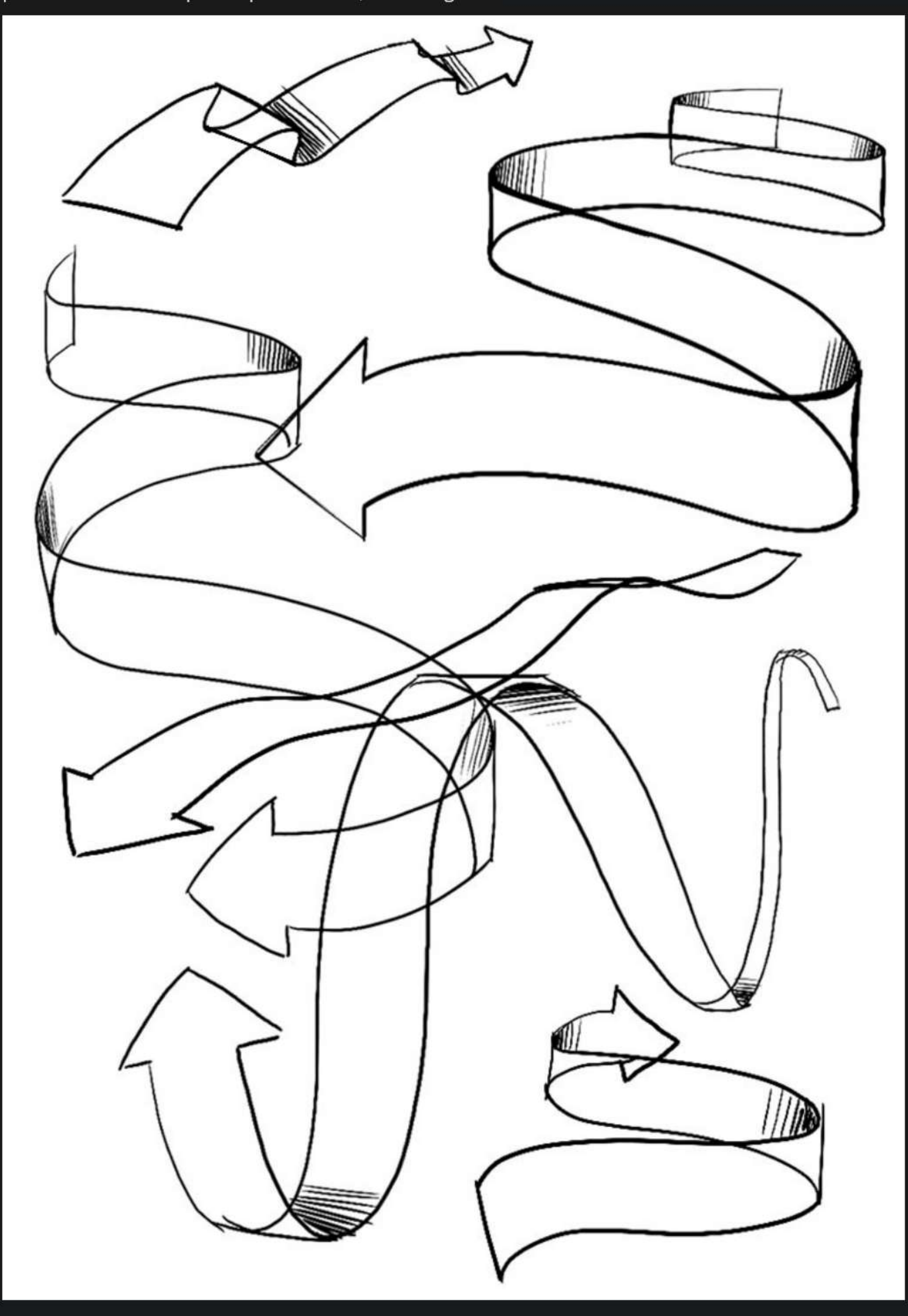
Mistake: Not applying perspective

While this arrow certainly does look three dimensional, it's still pretty limited to the space defined by the page. You need to let it push into perspective and explore the depth of the scene and apply foreshortening (making the farther end smaller and the closer end larger).

Example homework

And when you're done, your page should look something like this. As you get used to the steps, don't be afraid to rearrange their order to suit you. Sometimes I'll start with a curving line, and then add the shorter lines across the width of the arrow, wherever the arrow would turn. This gave me something to aim for when constructing the opposite edge, making things a little easier at times.

Also, as you can see here, I don't worry too much about letting my arrows overlap each other altogether. I don't want to feel restricted in my exploration of space, so I'll draw the edges however I please. If one ends up on top of another, it's no big deal.



<<< Thinking in 3D

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WHAT THE HELL AM I SUPPOSED TO DRAW?!

The Science of Deciding What You Should Draw

Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

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Lesson 2: Contour Lines, Texture and Construction

Organic Forms with Contour Lines

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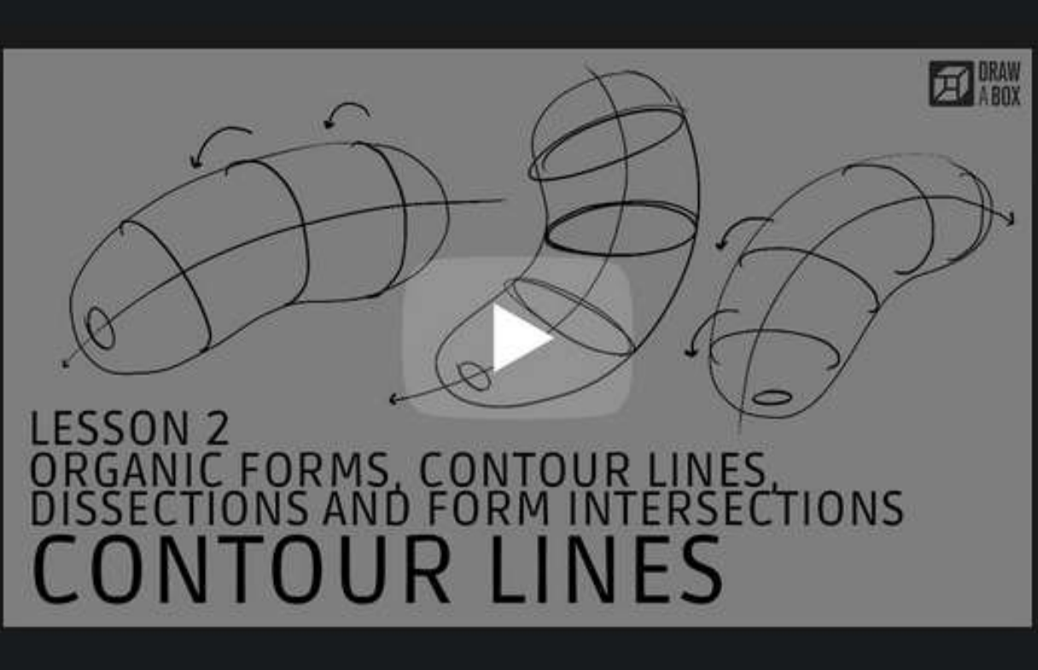
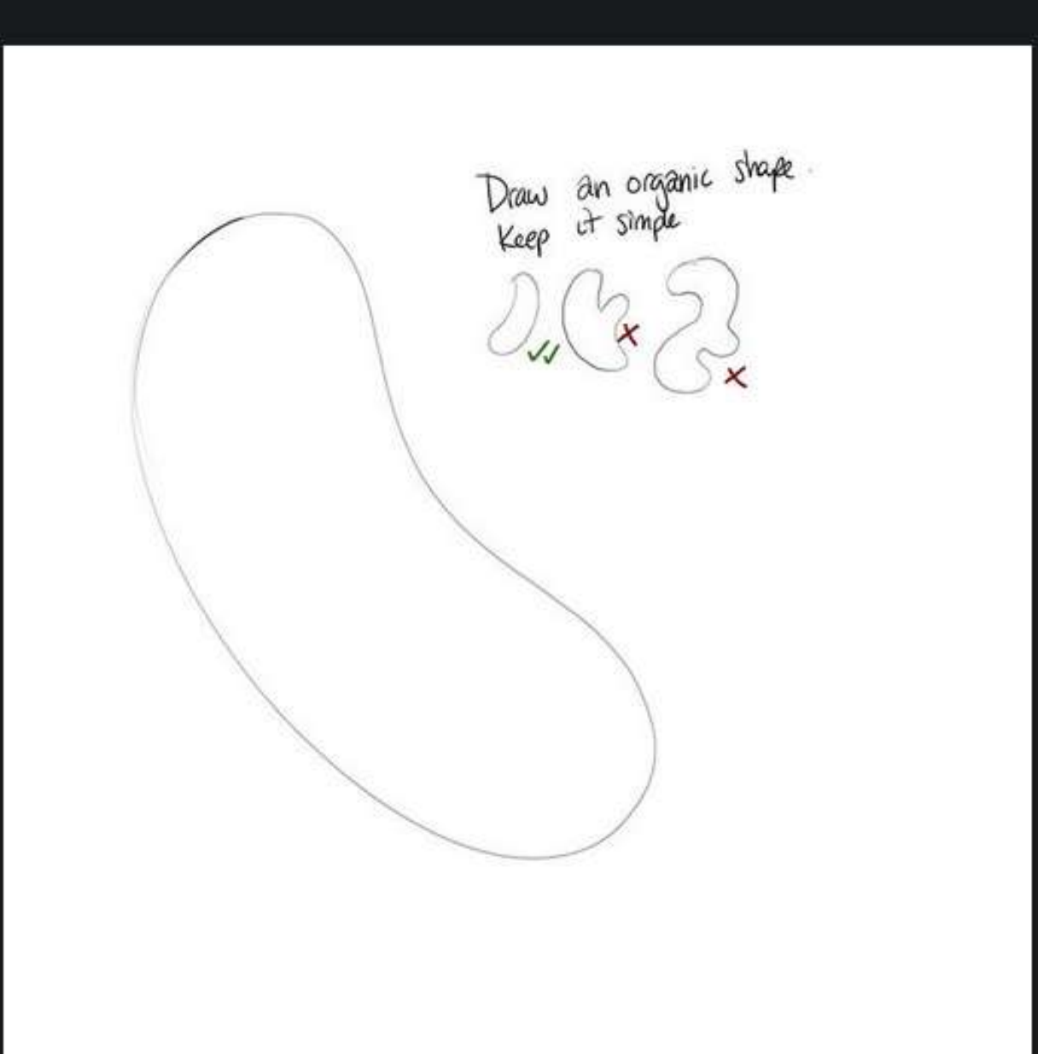
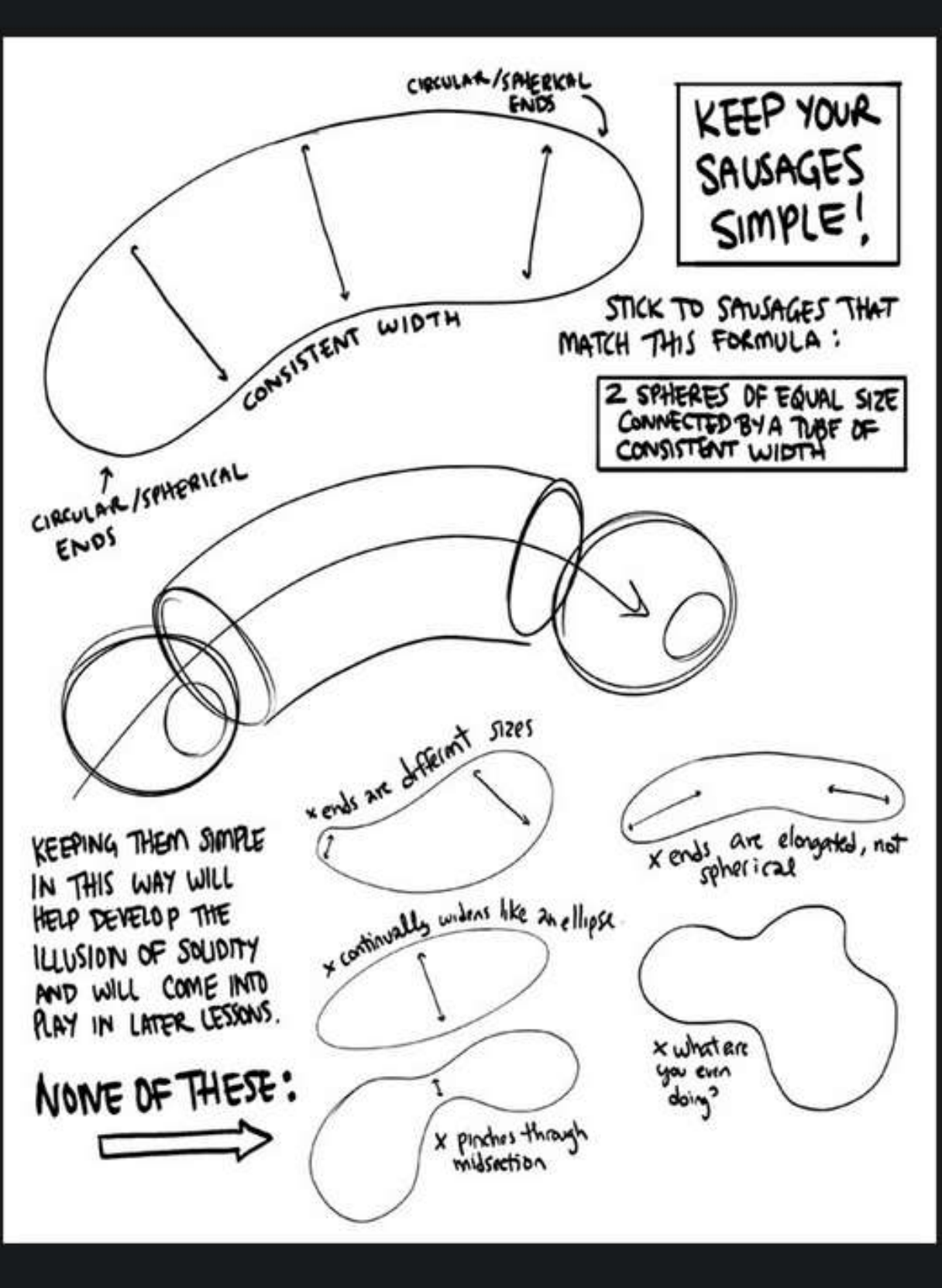

DRAW A BOX
LESSON 2
ORGANIC FORMS, CONTOUR LINES, DISSECTIONS AND FORM INTERSECTIONS
CONTOUR LINES

Here we're going to tackle contour lines, a technique that you will carry with you for a long time to come both as a constructional technique to help you better understand how the forms you draw sit in 3D space, and how their surfaces curve and distort, as well as a technique to help convey those concepts to your audience in your final designs and illustrations.



So we're going to start out with a **simple** sausage form. It's basically like two balls connected by a tube of consistent width. Don't make this form more complex than this - I don't want to see any branching, or any tapering/swelling through its midsection. Making it more complicated is only going to draw your attention away from the focus of the exercise.

On top of that, sausage forms are extremely useful, especially later in the animals lesson.

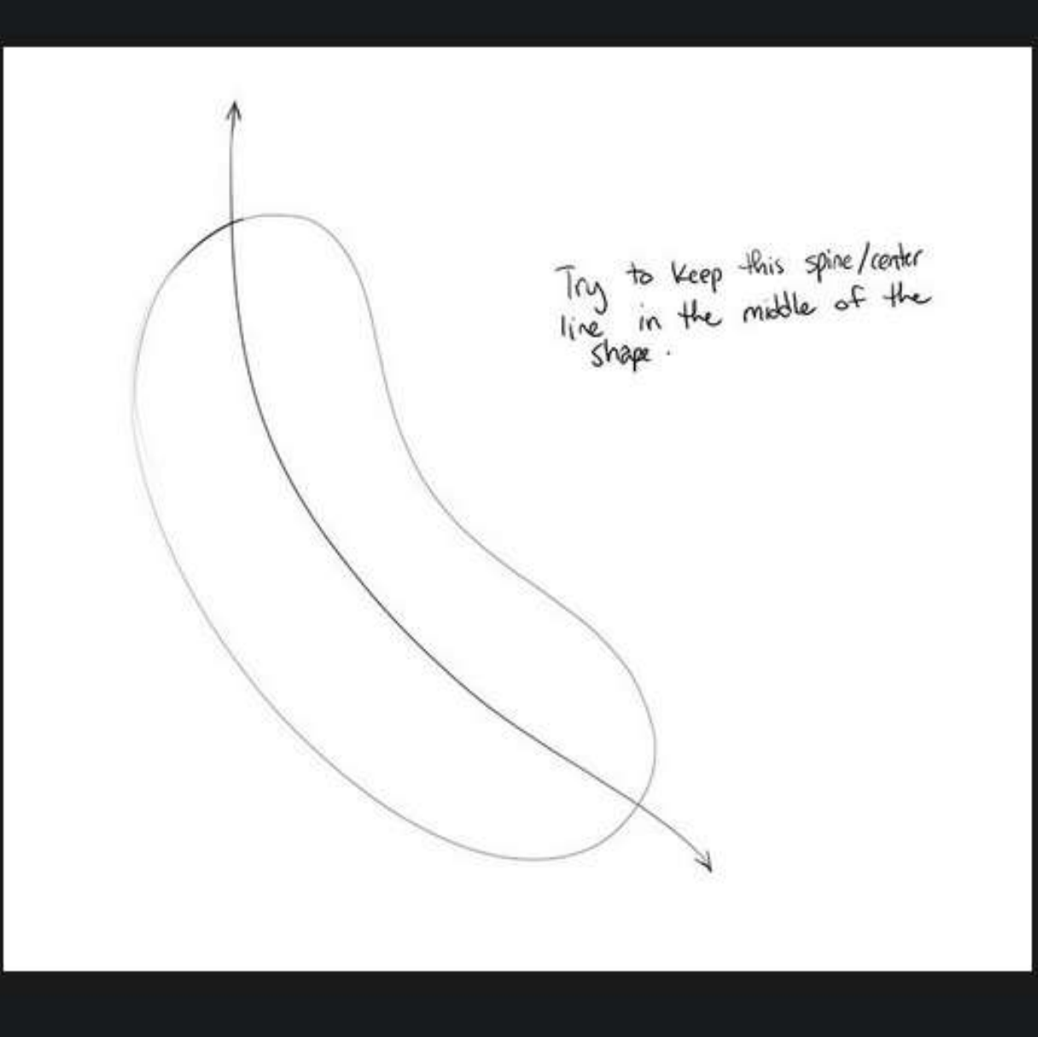

CIRCULAR/SPHERICAL ENDS
KEEP YOUR SAUSAGES SIMPLE!
CONSISTENT WIDTH
STICK TO SAUSAGES THAT MATCH THIS FORMULA:
2 SPHERES OF EQUAL SIZE CONNECTED BY A TUBE OF CONSISTENT WIDTH
CIRCULAR/SPHERICAL ENDS
KEEPING THEM SIMPLE IN THIS WAY WILL HELP DEVELOP THE ILLUSION OF SOLIDITY AND WILL COME INTO PLAY IN LATER LESSONS.
NONE OF THESE:
x ends are different sizes
x ends are elongated, not spherical
x continually widens like an ellipse
x what are you even doing?
x pinches through midsection

Students have regularly missed what I stated in the previous stage, so let's go through this again:

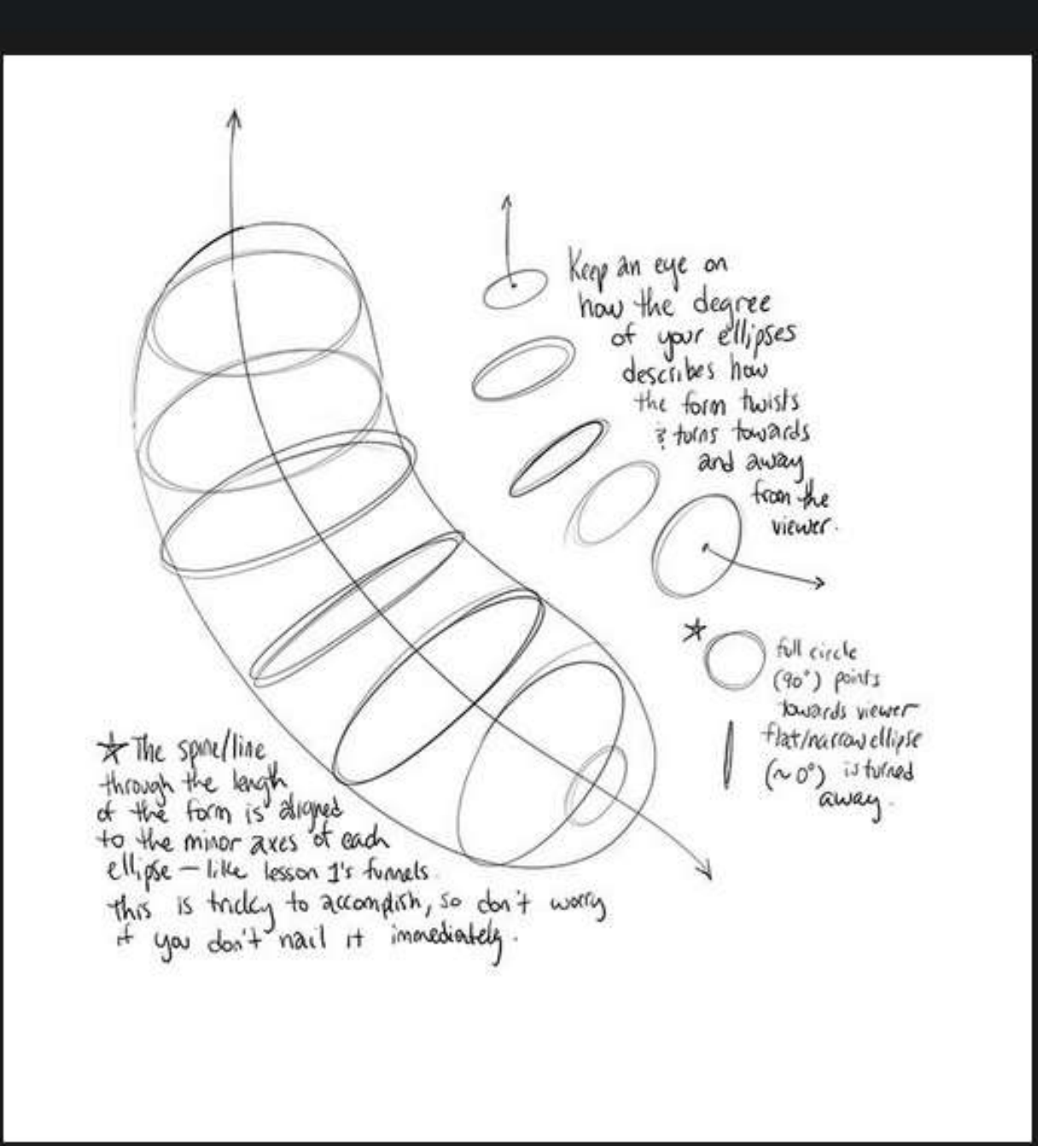
KEEP YOUR SAUSAGES SIMPLE. The formula you want to match is two equally sized spheres connected by a tube of consistent width. Avoid:

- Ends of different sizes
- Roundedness on the ends that stretches farther than the size of a sphere
- Midsections that swell or pinch
- Completely arbitrary organic shapes

This will come into play in future lessons, especially as we use these as one of the basic forms of organic construction.


Try to keep this spine/center line in the middle of the shape.

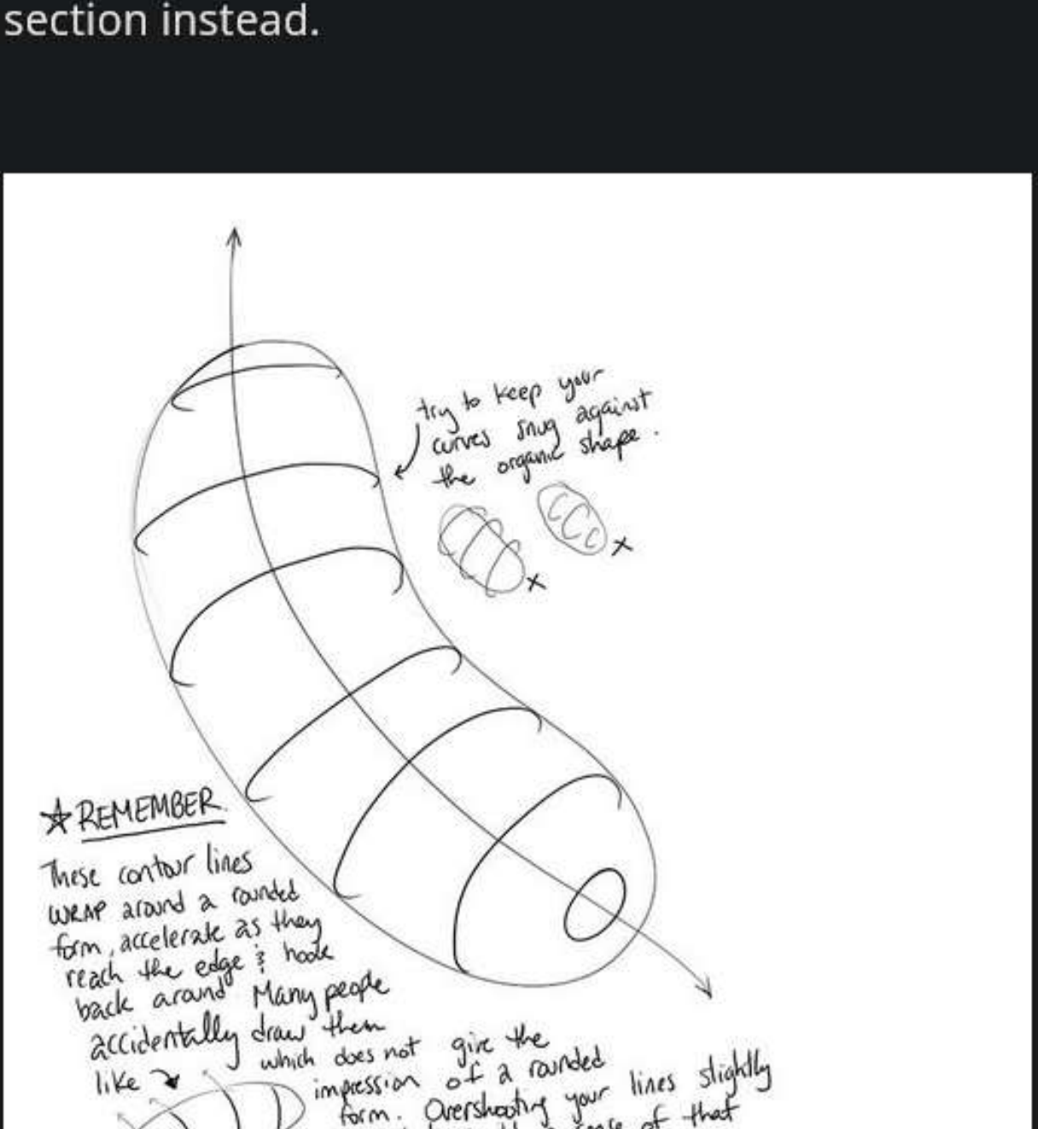
Draw a line through the center of this form. Try your best to keep it centered, but even if you miss it, that's okay. This line will represent the minor axis of the contour ellipses we're going to add next, though you can think of it like this form's *spine*.


Keep an eye on how the degree of your ellipses describes how the form twists & turns towards and away from the viewer.
full circle (90°) points towards viewer
flat/narrow ellipse (~0°) is turned away.
The spine/line through the length of the form is aligned to the minor axes of each ellipse - like lesson 1's funnels. this is tricky to accomplish, so don't worry if you don't nail it immediately.

Place a series of ellipses along this spine, aligning their minor axes to it. If the spine is not entirely centered, you'll have to try and align them to where the spine *would have been*. Having a line there to begin with actually helps with this, but don't adhere to it too closely if it's not actually centered.

When drawing your ellipses, be mindful of each one's degree. If you remember from lesson 1, this is the width of an ellipse. As you pick a different position along the length of that sausage form, the orientation of that cross-sectional slice is going to be a little bit different relative to your viewing angle, resulting in a slightly different degree.

In the homework assignment for the first part of lesson 2, I ask for two pages of organic forms, one with contour ellipses. That's what this depicts. For the contour curves, look to the next section instead.


try to keep your curves snug against the organic shape.
REMEMBER
These contour lines wrap around a rounded form, accelerate as they reach the edge & hook back around. Many people accidentally draw them like
which does not give the impression of a rounded form. Overshooting your lines slightly can help build a sense of that curvature, but pull this back as you gain confidence.

For the other page of the homework assignment, instead of drawing full ellipses, I want you to draw only the section of the ellipse that will be visible. This is going to be a curving line whose curvature accelerates as it reaches the edge just before it hooks around and continues along the other side.

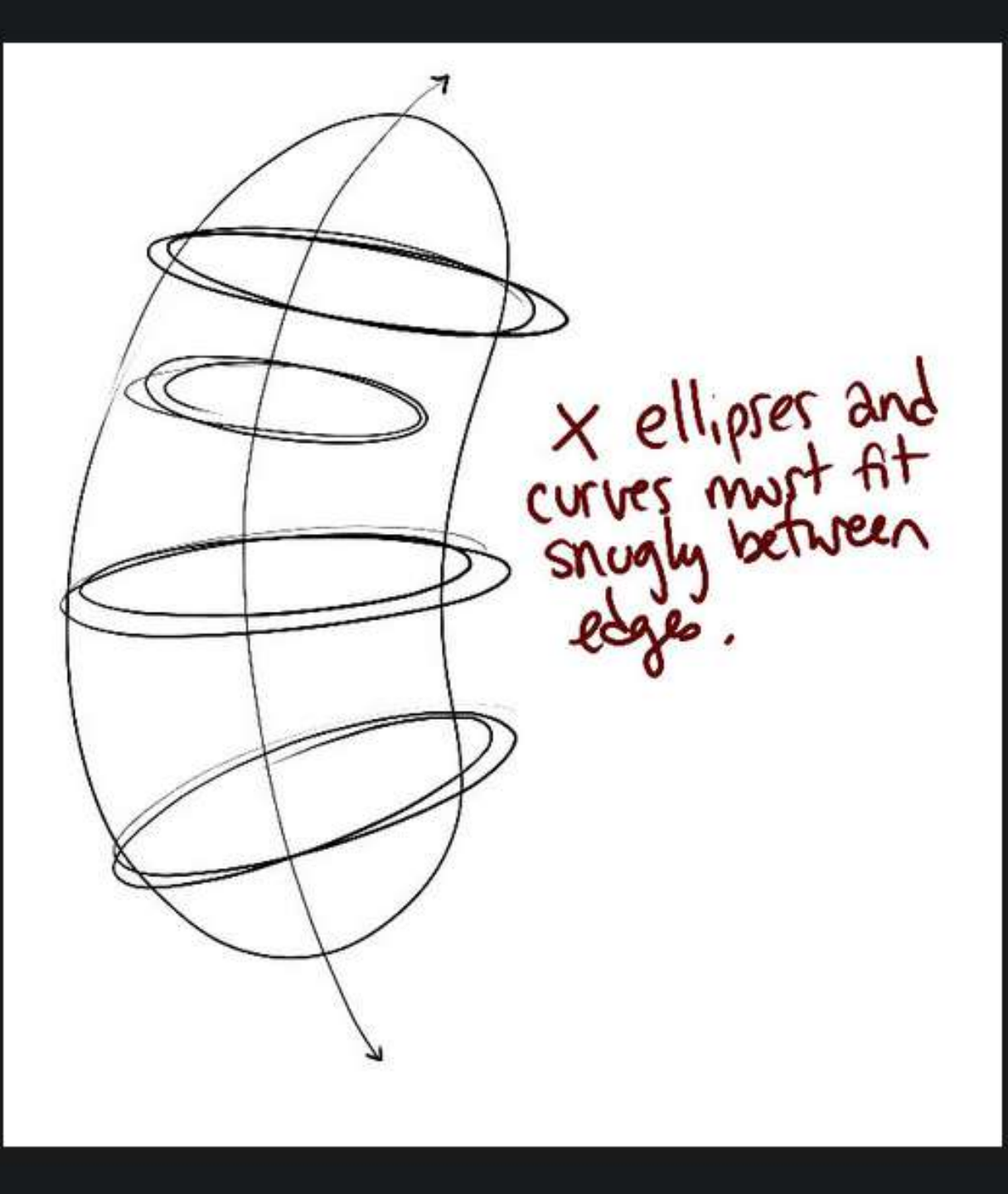
You can see in this image that I overshoot my curves slightly as they hook around, so we can see a little bit of how it'd continue along the other side. I'd like you to do the same, as this is going to get you accustomed to how to achieve that kind of curvature.

If you look at the very end (towards the bottom right) of the sausage in this image, you'll see a little contour ellipse there. We can see the entirety of this ellipse because it's facing towards us - this also happens to serve as a very effective visual cue.

The purpose of this exercise

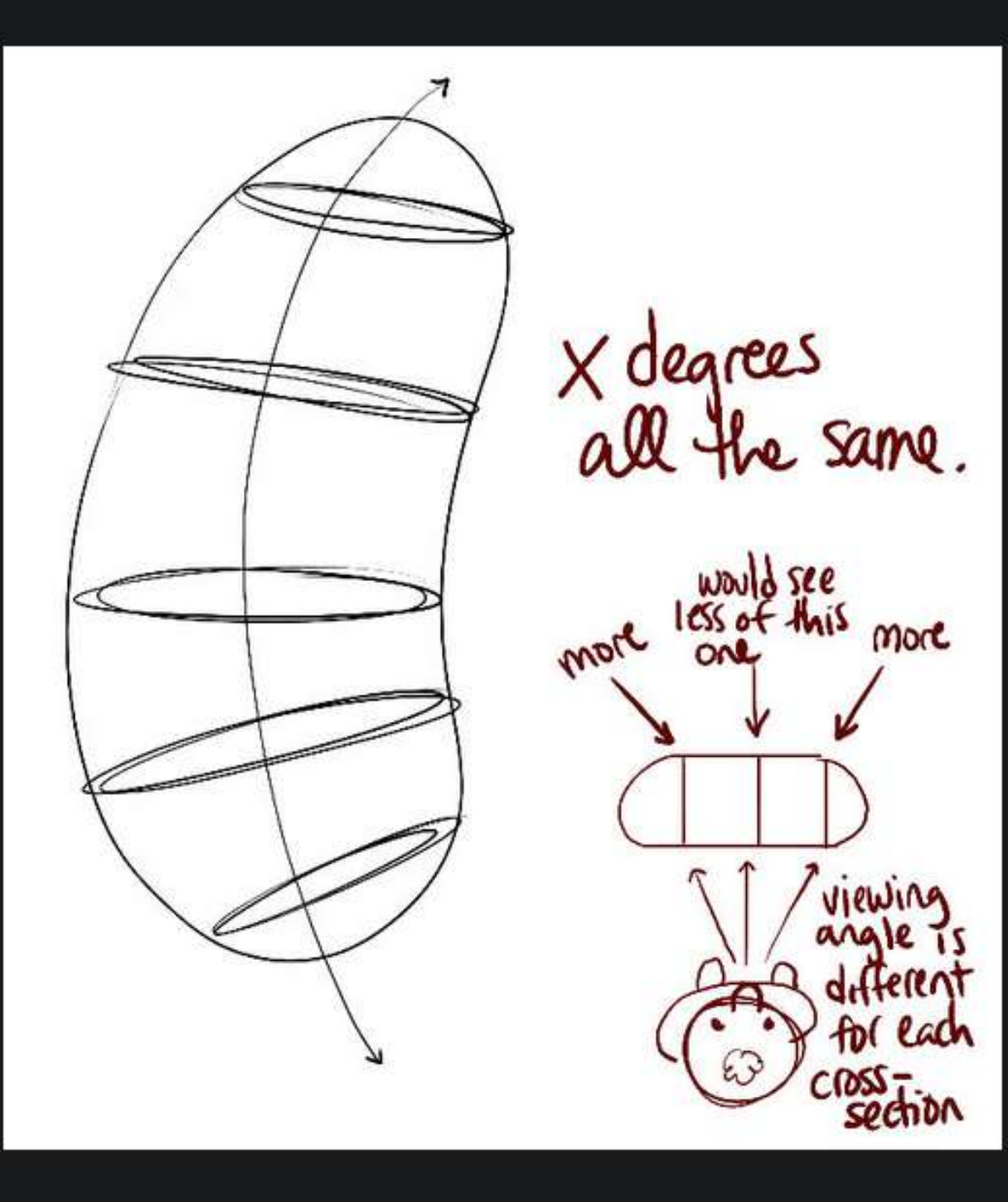
Contour lines themselves are something we're going to use a great deal throughout our later lessons, as it'll help us to better understand how these forms that we're drawing exist in 3D space, and how they relate to one another. They'll also help us to reinforce the illusion that they're solid and three dimensional.

One important thing to keep in mind however is that you don't want to get in the habit of simply dropping a bunch of contour lines on something for no reason. In this exercise it's not really an issue because we're simply practicing their use. When using them in actual drawings, I frequently see students draw far too many without any real consideration of what each individual one is meant to accomplish. So before you draw a contour line as part of a construction - or really, before you draw any line - think about what it is meant to accomplish as part of your drawing. If it isn't going to be contributing much, or if that task can be done better with a different mark (or is already being accomplished by another), don't draw it. Otherwise, draw it using the ghosting method - plan it out, take your time, and execute it with confidence.


x ellipses and curves must fit snugly between edges.

Mistake: Curves/ellipses floating arbitrarily

As the contour line illusion is based around the idea that these lines run along the surface of a given form, it's pretty important that you strive to keep these contour ellipses and curves snugly pinched between the edges of the organic form. This won't always be easy, but there's definitely a visible difference between someone making an attempt to achieve that, and someone for whom it is not a significant priority. Be the former.


x degrees all the same.
more
would see less of this one
more
viewing angle is different for each cross-section

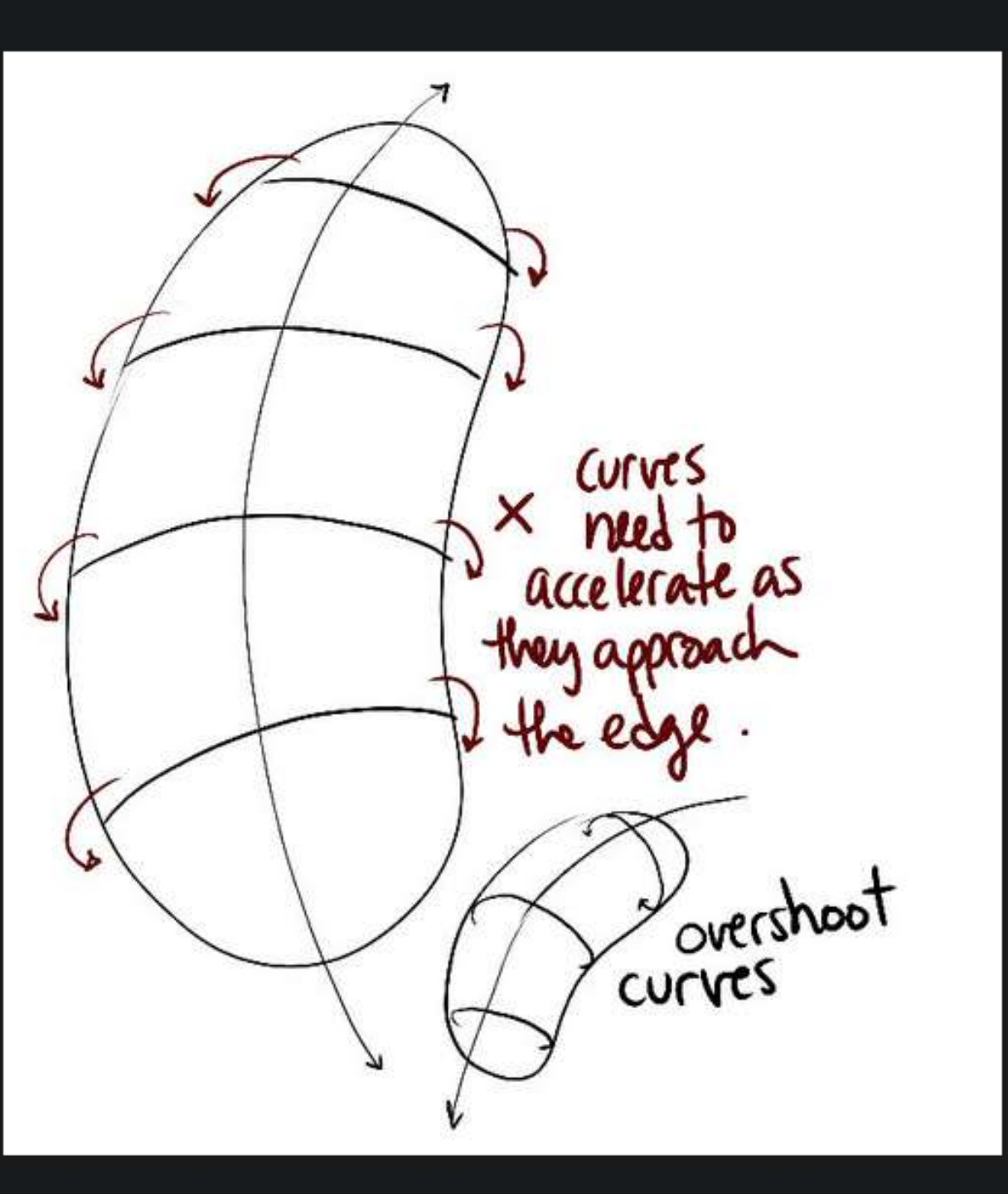
Mistake: Degrees all the same

As mentioned in the instructions for the exercise, give your ellipses a bit of a shift in their degree as you run through the length of the form.

The reason for this is explained in the little exaggerated red doodle. When you have an object held in front of you and you take three parallel slices of it, your viewing angle for each slice is going to be different. If it's dead center in front of you, you're not going to be able to see any of its face, just its edge. If it's off to the side, you'll see a little more of it.

Now because the size of sausage form is actually quite small, the shift isn't going to be that significant (unless the form itself is bending, which it may well be). All the same, you're not going to end up in a situation where the degrees are all the same.

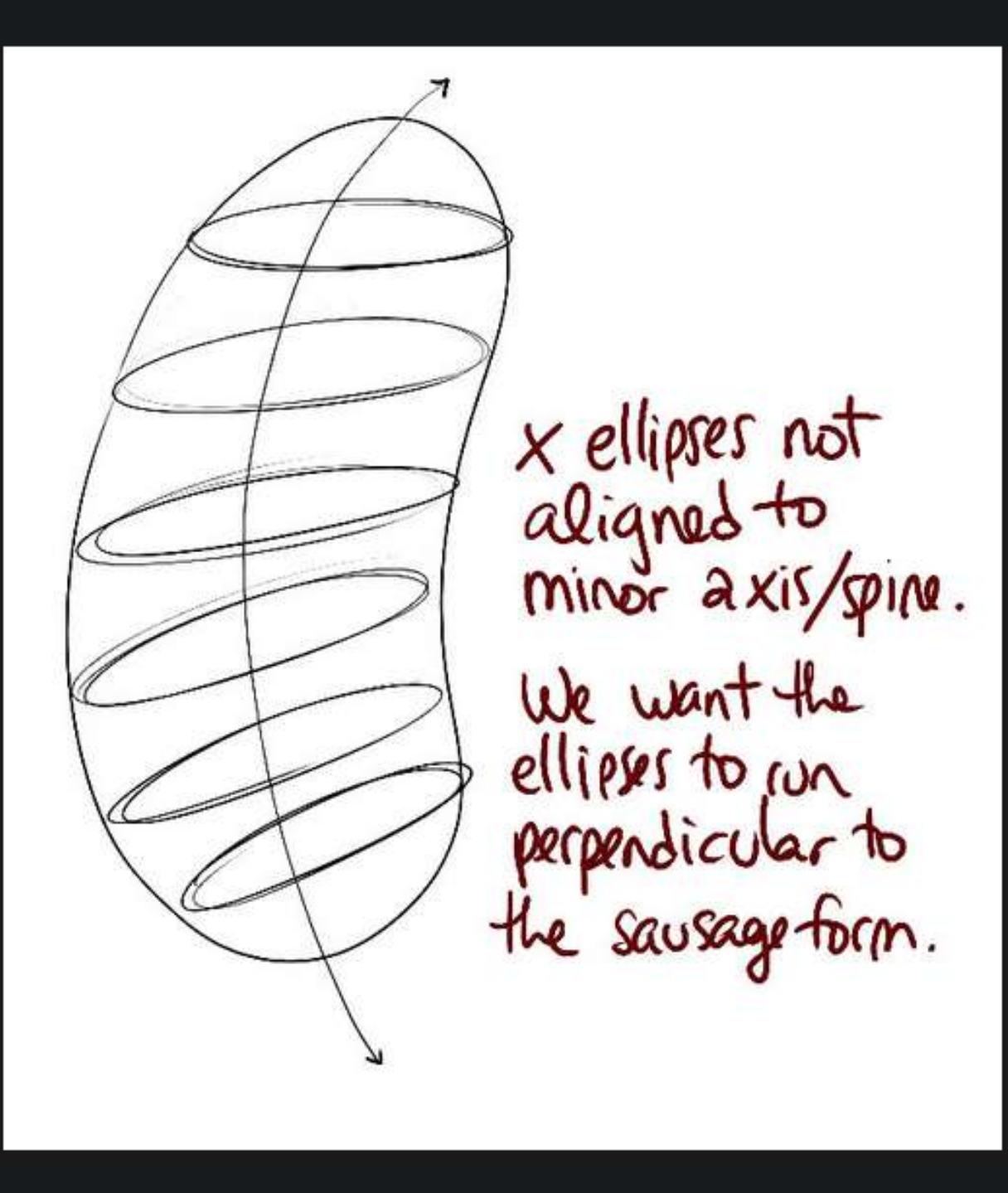
... At least not unless it's bending backwards in just the perfect amount but we're not going to get into that.


x curves need to accelerate as they approach the edge.
overshoot curves

Mistake: Curves too shallow, don't hook around

In the instructions for the lesson, I mention that when drawing contour curves, you should try to overshoot them just a little bit. That doesn't mean have them fall outside of the form, but rather that you should let them continue along onto "the other side of the form".

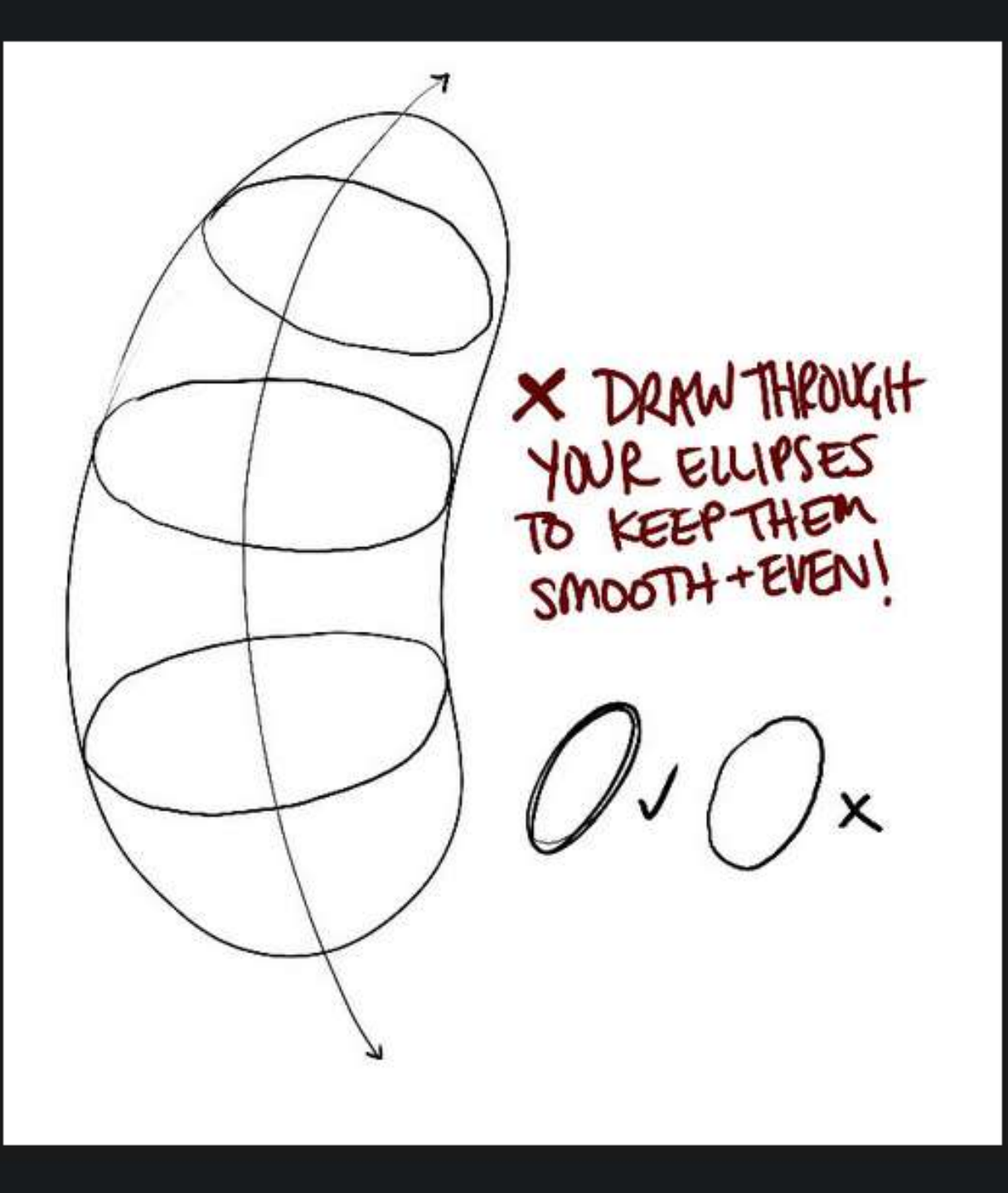
A lot of students find that when they don't do this, even if their contour *ellipses* are great, they run into this problem where their contour curves end up being too shallow. Learning to accelerate the curvature of the line as it reaches the edge is important, and the overshooting method definitely helps.


x ellipses not aligned to minor axis/spine.
We want the ellipses to run perpendicular to the sausage form.

Mistake: Ellipses misaligned

Similar to having your ellipses floating around, it's not necessarily easy to nail the alignment of your ellipses each and every time. It is however obvious when a student is making an attempt to achieve that goal, and when a student is clearly not aware of that as a requirement.

Each ellipse should be aligned to your spine line as its minor axis - or in the case that it wasn't centered properly, where that spine line ought to have been. You want it to cut each ellipse into two equal, symmetrical halves down its narrower dimension, just like we did in lesson 1's funnel exercise.

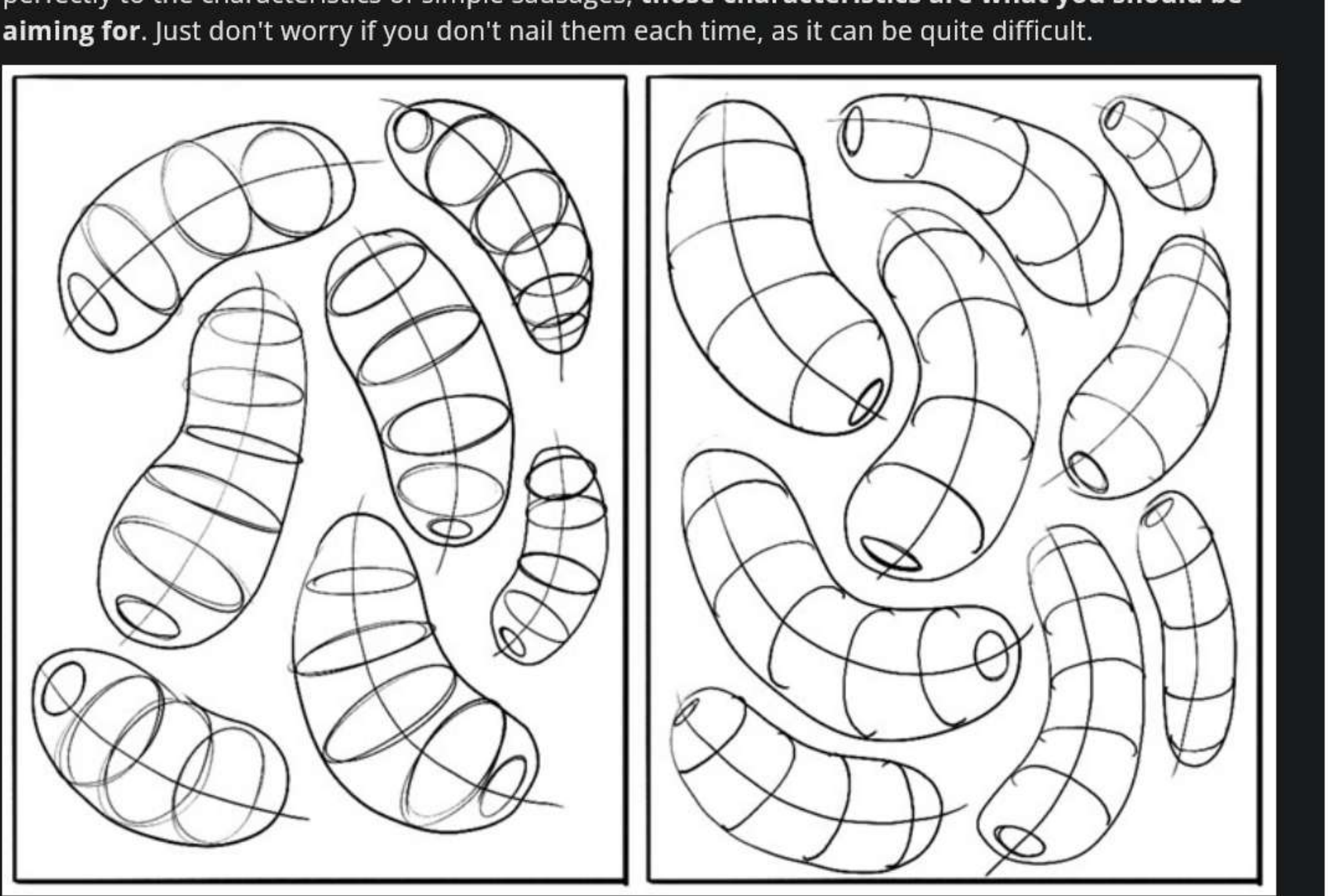

x DRAW THROUGH YOUR ELLIPSES TO KEEP THEM SMOOTH + EVEN!
✓
x

Mistake: Not drawing through ellipses

As mentioned in lesson 1, every ellipse you draw for these lessons should apply this technique of drawing through the shape two full times before lifting your pen. This is meant to help you maintain a certain degree of confidence so as to keep things smooth and even.

Example homework

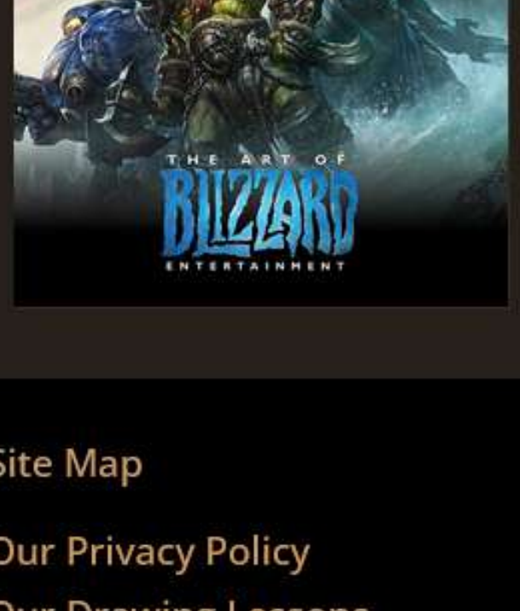
And when you're done, your pages should look something like this (one page of contour ellipses, one page of contour curves). Note that while the sausage forms shown below aren't always adhering perfectly to the characteristics of simple sausages, **those characteristics are what you should be aiming for**. Just don't worry if you don't nail them each time, as it can be quite difficult.



<<< Thinking in 3D

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.



The Art of Blizzard Entertainment

While I have a massive library of non-instructional art books I've collected over the years, there's only a handful that are actually important to me. This is one of them - so much so that I jammed my copy into my overstuffed backpack when flying back from my parents' house just so I could have it at my apartment. My back's been sore for a week.

The reason I hold this book in such high esteem is because of how it puts the relatively new field of game art into perspective, showing how concept art really just started off as crude sketches intended to communicate ideas to storytellers, designers and 3D modelers. How all of this focus on beautiful illustrations is really secondary to the core of a concept artist's job. A real eye-opener.

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VIEW HOMEWORK SUBMISSIONS

SUBMIT HOMEWORK FOR REVIEW

Thinking in 3D
- Box Challenge
- The great conspiracy
- Telling a convincing lie
- Exploring a 3D space
- Contour lines
- Homework and exercises

Texture and Detail
- Understanding texture
- Observation and memory
- Visual library
- Don't worry about shading here
- Cast shadows
- Implicit vs explicit
- Detail density
- Silhouette
- Don't copy your reference - understand it
- Homework and exercises

Construction
- Constructional Drawing
- The process
- Observation vs construction
- A technique for learning
- Homework and exercises

Lesson 2: Contour Lines, Texture and Construction

Texture and Detail

Hate to read? No problem. **We can read the text to you**.

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

LISTEN WITH DRAWABOX

Understanding texture

Up until this point, we've largely explored matters relating to solid, three dimensional forms. Things with volume to them that occupy space and relate to one another in that space. This last point is something we'll focus on a great deal in the next section.

Texture - that is, what people tend to think of as detail - isn't actually all that different. While we treat it a little differently, texture is also made up of three dimensional forms. The only difference is that these forms adhere to the surface of some other object - and this difference fundamentally changes how we approach drawing it.

An example I like to use is fish. If you've got a fish swimming in the ocean, then we draw it similarly to how we draw the boxes and sausage forms we've tackled thus far. We apply constructional means - drawing through our forms, defining their silhouettes with outlines, describing how their surfaces move through space with contour lines, etc.

If, however, you take a bunch of fish and use it to wallpaper your bedroom, it becomes a texture - and the way we draw it changes. The fish is now a part of the wall itself. If the wall turns, the fish will follow. If you were to strip down this fishy wallpaper and wrap it around a box instead, the fish would come along with it. They cease to be an independent object, but rather become a part of this *texture* that can be applied to any other surface.

Now, before we get into why that matters, first we have to take a bit of a detour.

Observation and memory

Before we even think about how to go about adding texture and detail to a drawing, we must first learn to slow down and *observe*. Your brain doesn't simply start off with any real knowledge of all the kinds of textures that exist in the world, so you don't really have much to pull from when you're looking to add detail to a drawing.

Sure, you've seen all kinds of textures in your daily life, but have you *really* taken any time to really look at them? In all likelihood, you saw them at a glance, your brain tucked the smallest bit of that information away while throwing away that which it deemed unimportant, and you went on with your life. That's normal, and it's how human brains - and specifically human memory - works.

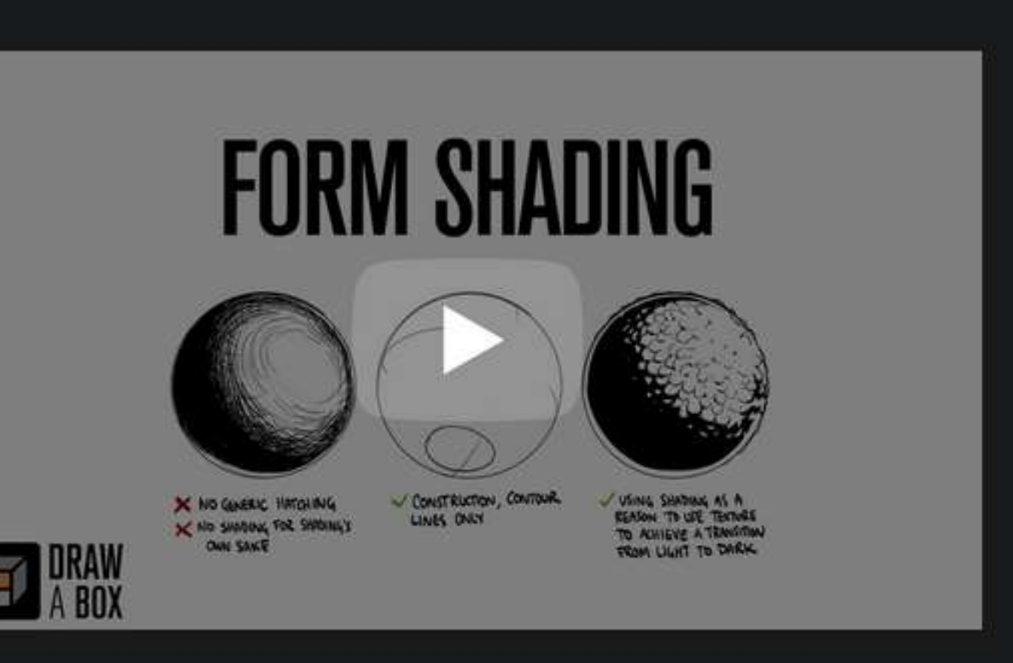
Okay, let's say you did for whatever reason really look closely and carefully at an object. That's fantastic, and you should absolutely keep that up. In all likelihood however, you're probably still not in a position to use that texture, because even if you looked at it a minute ago, your memory's still done its job and thrown away all of the *superfluous* details it didn't deem worthy of recording. Unfortunately most of the information you need to draw a texture is going to be considered unimportant.

What does that mean? It means you're going to have to spend most of your time looking at and studying an object, or some reference imagery of that object. You're going to put a lot of time into really identifying the visual elements that exist on it, whatever makes it look wet, dry, sticky, smooth, rough, etc. as well as how those elements are arranged. Once you've done that, you'll go ahead and make a mark or two on your page to represent a specific feature you identified that you want to transfer over, and then you're going to go back to studying it - because your memory has already started throwing everything out the window.

Visual library

Ultimately this process (of observing and studying and then transferring that information into your drawing bit by bit) is something that is gradually going to rewire your brain to better retain the information that will be critical to our purposes. Over time you'll develop what many artists refer to as a *visual library* - a part of your memory where you hold bits and pieces of information that can be applied to details and textures, as well as to generally understanding how certain kinds of things are put together or constructed.

None of it will be complete, but sometimes that's where the best designs come in - from misremembering a tiny piece of information here and there, and then taking it wherever it leads. But that's a discussion for a much, much later lesson.


FORM SHADING
✗ NO GENERIC HATCHING
✗ NO SHADING FOR SHADING'S OWN SAKE
✓ CONSTRUCTION, CONTOUR LINES ONLY
✓ USING SHADING AS A REASON TO USE TEXTURE TO ACHIEVE A TRANSITION FROM LIGHT TO DARK
DRAW A BOX

Don't worry about shading here

When thinking about detail, a lot of students end up trying to add shading to their drawings, relating detail to the act of simply making their drawing look *pretty*. Shading (making a surface lighter if it turns towards the light source, darker if it turns away) is actually a very common concept covered in most drawing courses, specifically as a means to convey how a form is 3D.

Drawabox takes a different path. We do not use shading for the purpose of making our forms feel 3D, as the constructional techniques we employ (drawing through forms, using contour lines, and purposely crafting the silhouettes of our objects) are vastly more effective tools for achieving that goal.

Furthermore, **everything we add to our drawings serves a specific purpose**. Therefore if the shading does not serve any such purpose (since it's already being handled by the techniques listed above), then we do not bother to include it.

There is one purpose that shading does offer to us, however. Specifically, it is the fact that form shading requires a smooth transition from light to dark. In many cases you'll see this achieved using hatching lines, since they can be built up more densely or sparsely to simulate a change in tone.

We can instead replace this hatching pattern with texture, effectively using shading as an excuse to sneak a little extra visual information into our drawing.

To keep it simple:

- Shading where you're just using generic hatching to achieve the transitions from light to dark should not be part of your drawings within this course
- Shading where those transitions are achieved with textures specific to the surface of that object, however, are perfectly acceptable.

While we specifically avoid shading in order to more directly focus on the spatial reasoning skills we're trying to develop here, it's still an important skill to learn - both in terms of understanding how light works, and depending on the kinds of tools you intend to explore, the techniques behind successful hatching.

Here are some course recommendations from our sponsor, **New Masters Academy**:

- Introduction to Inking with Miles Yoshida
  In the first two lessons of this course, Miles explores different ways to approach hatching and where they're most suitable, covering both hatching with straight lines, as well as hatching using curvilinear and squiggly strokes.
- Fundamentals of Observational Drawing with Iliya Mirochnik
  This course contains two lessons dedicated to exploring the fundamentals of light and shadow, where Iliya breaks down the core concepts of shading, and explores the way in which light behaves in the world.

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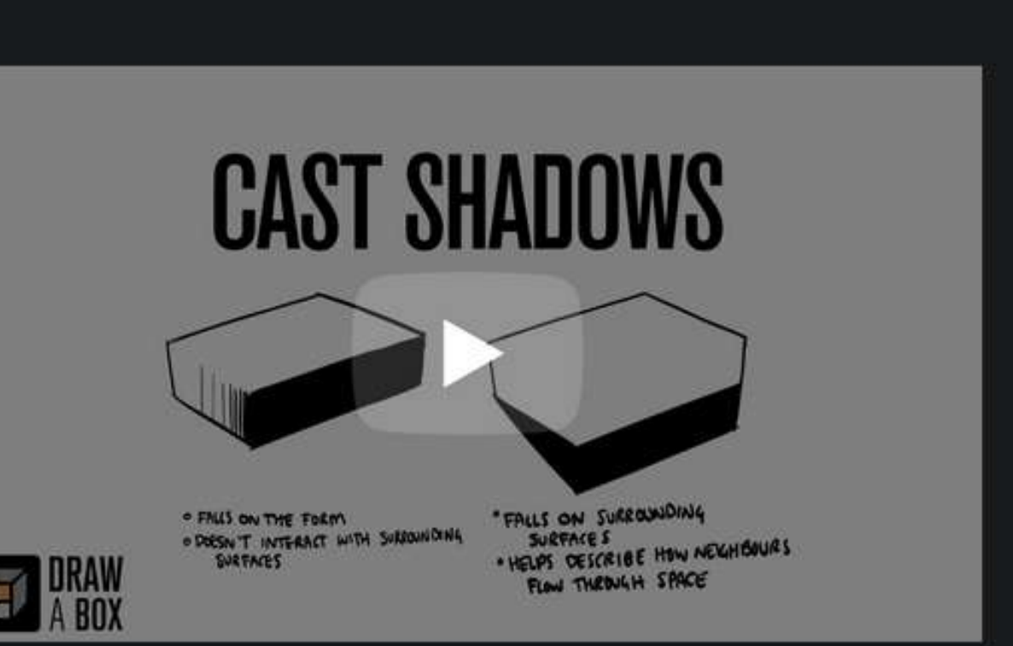
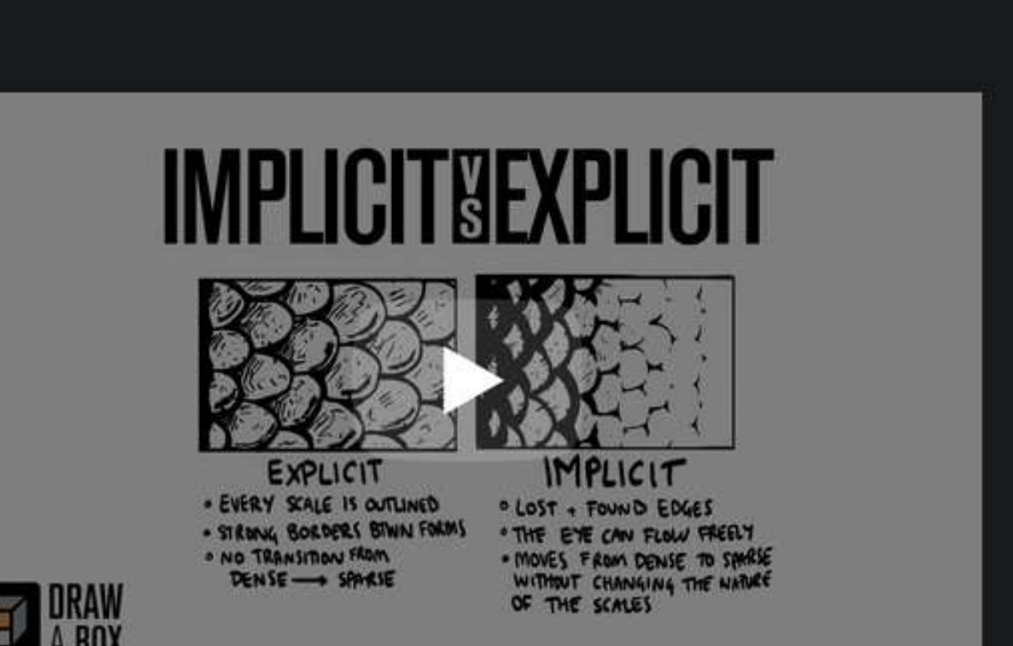

CAST SHADOWS
• FALLS ON THE FORM
• DOESN'T INTERACT WITH SURROUNDING SURFACES
• FALLS ON SURROUNDING SURFACES
• HELPS DESCRIBE HOW NEIGHBOURS FLOW THROUGH SPACE
DRAW A BOX

Cast shadows

Instead of form shading, what your primary focus should be is on **cast shadows**. Cast shadows occur when a form blocks the light. The key thing here is that where form shading occurs on the form in question itself, cast shadows are projected onto *another* surface.

Texture is made up of the little forms that sit along the surface of a given object, and each of these *textural* forms can cast shadows. In fact, all of the lines we perceive as being part of a texture are generally just that: shadows.

All of the bumps, the changes in topography (where the surface rises or falls), little holes or scratches, etc. can all be thought of as independent bits of form that are added to or taken away from the surface of our object, and each one interacts with the light that is being shined upon it.


IMPLICIT VS EXPLICIT
EXPLICIT
• EVERY SCALE IS OUTLINED
• STRONG BORDERS BTWN FORMS
• NO TRANSITION FROM DENSE → SPARSE
IMPLICIT
• LOST + FOUND EDGES
• THE EYE CAN FLOW FREELY
• MOVES FROM DENSE TO SPARSE WITHOUT CHANGING THE NATURE OF THE SCALES
DRAW A BOX

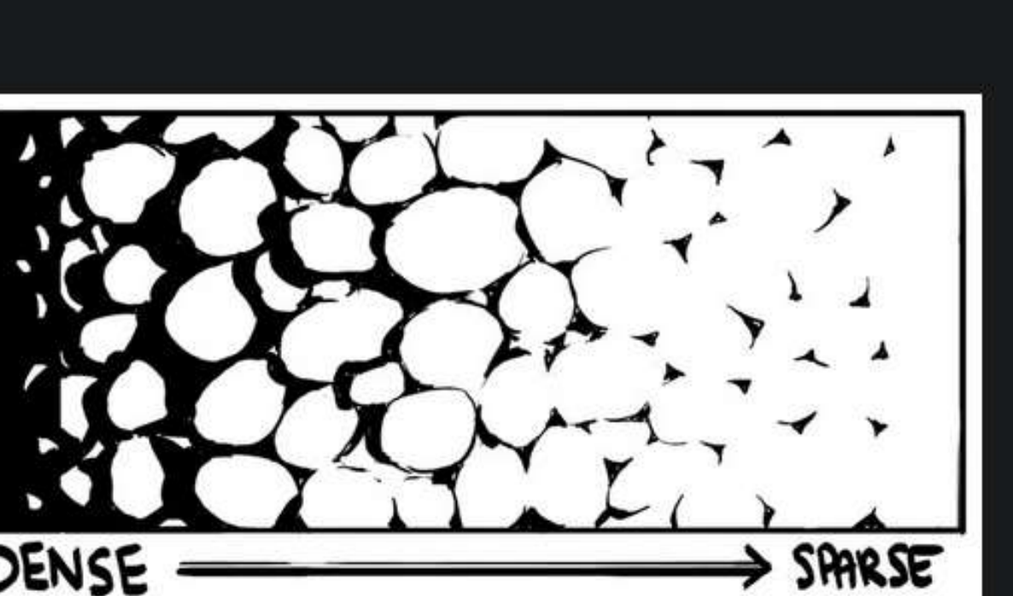
Implicit vs explicit

This brings us to why knowing something to be a texture (as opposed to a free floating, constructed object) is important. As mentioned before, it determines how we go about drawing it. Going back to the previous analogy, if we have a fish floating freely in the sea, we want to define it in explicit terms, clearly defining the forms that make up its body and how they exist in 3D space in relation to one another.

When the fish is stapled to the wall however, this ceases to be the case. As we can have thousands of these fish all lined up against the same surface, if we were to draw each and every one *explicitly*, not only would it end up being an insurmountable task, it would also look horrible. All that detail would result in a great deal of visual noise - basically a lot of light and dark marks crammed together generating so much contrast that the viewer's eye would shoot right to it. It would probably even hurt to look at.

We always have to be in control of our drawing - and specifically, how our drawing leads the viewer's eye around. As such, focal points must only exist where *we* intend them to. The trick to achieving this kind of control is to *imply* the presence of forms. We can do this by leveraging the cast shadows explained above - instead of actually drawing outlines around each of these textural forms, instead of drawing them directly, we capture the shadows they cast on their surroundings.

When people track a particularly elusive animal in the wilderness, they can derive a lot of information from the signs they leave behind. The tracks, their scat, the fur that might get caught on branches and bushes. Without ever seeing the animal itself, they can get a sense of how big it is, what colour, what it's been eating - that's essentially what we're providing the viewer with here. We're not drawing the forms themselves, we're not giving them explicit and direct information, but instead we're giving them enough from which to derive a general understanding of how that form sits along the surface of the object, how big it is, etc.

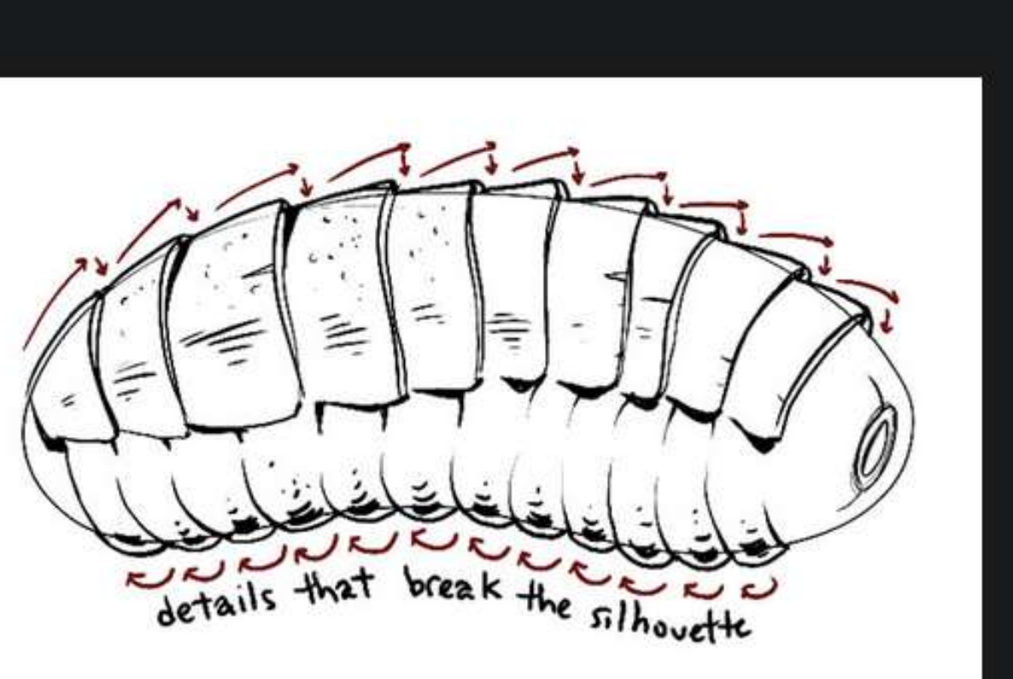


Detail density

One of the biggest advantages to working implicitly is that it allows us to vary how densely we want to pack in detail across the surface of our object without actually changing the nature of what is being communicated to the viewer.

Let's say we have an object with a lot of very tiny scales on it. We may want to draw a lot of scales in a particular location along its surface (to create a focal area and draw the viewer's eye), but draw very few scales, or none at all in another point on it (to give the viewer somewhere to rest their eyes, creating a nice sense of balance to the drawing). Working implicitly, drawing *only* shadows, allows us to achieve a smooth transition from the densely detailed to the sparsely detailed areas without ever suggesting to the viewer that there are more actual scales in one area, and fewer in the other.

This is achieved by giving the impression that there is more light hitting one area, and less in another. We get a lot of detail packed in when we've got medium lighting conditions - that's where we get a lot of the grey values that transition between light and dark. If we lower the lights, then the shadows grow deeper, merging into one another and creating large swathes of solid black. If we increase the light, we start burning the shadows away, leaving only those that fall within the deepest cracks where multiple forms come together.


details that break the silhouette

Silhouette

Now, all of the information we pack onto the surface of a form is nice and all, but that kind of internal detail isn't actually all that important - not compared to detail conveyed in the silhouette of the object.

A silhouette is basically what you can see if the whole of an object or form is filled in with solid black. At that point, all you can make out are its external edges. Any information that breaks the silhouette and stands out from that shape is going to read very clearly. It's an effective tool that can be used to great effect, or abused terribly.

The reason the silhouette is so powerful is that it's the first thing the eye registers, before even considering any of the information present inside. Your subconscious first picks that out, and then as necessary will start evaluating the rest. Because it's prevalent at the beginning of the process, it has the biggest impact. This is why when you have a good friend approaching you from a great distance, you can still tell it's them from their silhouette, as well as how that silhouette changes as they walk with their particular stride.

This comes into play a great deal in design, because you generally want important objects or characters to have a silhouette that is not only distinctive but informative as well - but that again is a discussion for another lesson.

Don't copy your reference - understand it

A lot of students make the mistake of thinking that the texture exercises are about copying your reference, but that is not the case.

Your reference is merely a source of 3D information. When we copy it directly however, all we're copying is two dimensional. Instead of looking for cast shadows in your reference and copying them, which basically involves taking something from a 2D photo and transferring it to a 2D drawing, approach your textural drawing in these three steps:

- **Observe**. Identify a specific form that is present in your reference. An individual scale, a bump, etc. Remember that we're focusing on actual forms - so if your texture has negative space like a hole or a crack, you're actually to focus on the walls and floor, as they're the forms that'll be casting shadows.
- **Understand**. Use the information your reference provides - through its cast shadows, its form shading, and any other visual signs you can pick up, to grasp how each textural form sits on the surface of the object and how it relates to the surfaces around it.
- **Transfer**. Moving to your actual drawing, you create a cast shadow shape - first outlining it (the shadow shape, not the textural form) in order to design it in a specific, intentional manner, then filling that outline in (you can use a brush pen or a thicker pen for the filling). The specific design of this shape is critical, because that's what defines the relationship between the form you're implying, and the surfaces around it.

The cast shadow you draw *may* be present in the reference image, or it may not. It may also be present, but different - because the reference is subject to one lighting scenario, while your drawing may have another - for example, with the gradients the light source is always at the far right, blasting away the cast shadows closest to it to create that transition in density.

Remember that you're *only* drawing cast shadow shapes, each one being outlined, then filled. You're not outlining your textural forms, you're not capturing form shading, and you're not capturing local/surface colour. It's *just* cast shadows.

Homework and exercises

Every Drawabox lesson consists of lecture content and exercises that are assigned as homework. It's best to complete this homework before moving onto the next section. As this lesson consists of three sections (thinking in 3D, texture, construction), it is best that you **only submit your work for review when you've completed all three**.

The homework assignment for this section is as follows:

- 1 filled page of the Texture Analysis exercise.
  - Your first texture should be crumpled paper, as this will force you to think more about the shadow shapes you're drawing, rather than outlines. For the crumpled paper, you're actually not going to worry about cast shadows - instead, its purpose is to get you used to working with bold, clearly defined black shapes, rather than being timid and using hatching. Your crumpled paper study/gradient should be made up of clearly defined, distinct black shapes and white shapes. We find that despite breaking away from cast shadows, this helps students become bolder and more confident, which then yields better results for the other two textures that follow.
  - The other two textures can be anything else. Remember that as explained above, you don't copy cast shadows from the reference - you create them based on your understanding of the forms that are present.
- 2 filled pages of the Dissections exercise

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here. You may also use a brush pen if you have one, though only to fill in large areas of solid black.

As you collect reference imagery for these two exercises, I highly recommend that you pick up PureRef, a free piece of software that allows you to build and save moodboards extremely easily. It works for Windows and MacOS, and allows you to drop in as many images as you like, scale/rotate /flip/move/arrange them as you please, and save them all to a single portable file.

<<< Thinking in 3D

Construction >>>

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

WHAT THE HELL AM I SUPPOSED TO DRAW?!

The Science of Deciding What You Should Draw

Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

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- The great conspiracy
- Telling a convincing lie
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- Contour lines
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- Understanding texture
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- Don't worry about shading here
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- Implicit vs explicit
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- Don't copy your reference - understand it
- Homework and exercises

Construction
- Constructional Drawing
- The process
- Observation vs construction
- A technique for learning
- Homework and exercises

Lesson 2: Contour Lines, Texture and Construction

Texture Analysis

Hate to read? No problem. **We can read the text to you**.

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

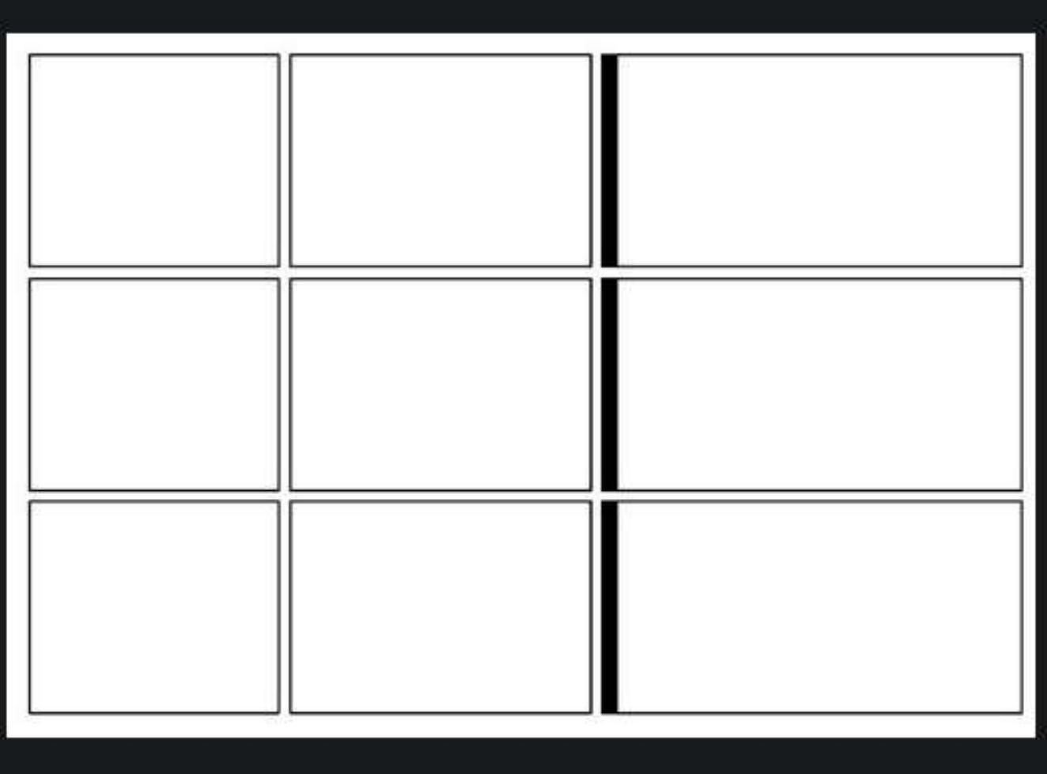
LISTEN WITH DRAWABOX

Video Demonstration

This exercise is a first step to learning how to tackle the unexpectedly overwhelming concept that is texture and detail. We'll start out by learning to study a reference image and to work past our all-too-human instinct to throw away critical visual information.

Then we'll explore applying what we've learned from our reference images as a tool - not bound by how it is presented and arranged in the reference, but in full control, using it to convey information exactly as is needed to get an idea across to our audience.

Remember that you should be doing this exercise with a fineliner/felt tip pen. If you're having trouble filling in the dark areas, a black brush pen can also be very useful.



Your page will be arranged into a very specific layout, as shown here. You'll have a number of rows, each row will be roughly 2.5 inches tall, starting with a square of that height and width on the left. The rest of the width of the page (I'm recommending 8.5x11 printer paper, you'll have to change the sizes around if you're working in paper of a different size) will be split into two rectangles more or less of equal size.

You are welcome to work with your page in landscape orientation (11 inches wide, 8.5 inches tall in this case) so you'll end up with 3 or so rows, though I'll leave that decision up to you.

Notice how the rectangle on the end there has a bit of a black bar on its left side - make sure you fill this in with solid black. It doesn't need to be too thick, just enough to be significant.

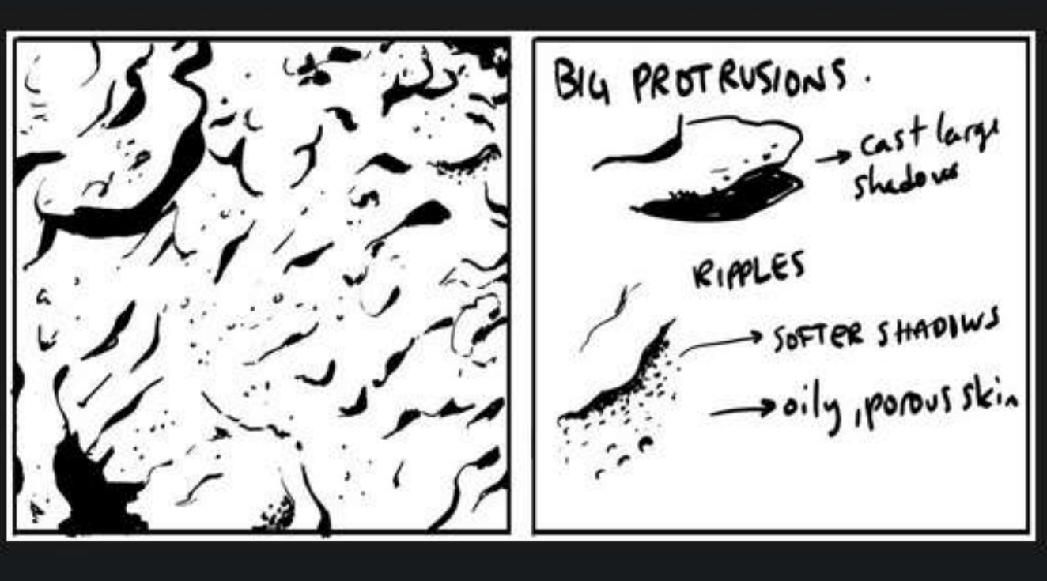
Each row is going to pertain to a different texture, and is going to require a different set of reference photos. You can use one, but it's better to use several photos of the same sort of thing, just to arm yourself with that much more visual information to draw from. Keep in mind that when we say texture, we're referring to a very specific thing.

Don't forget - the assigned homework states that your first row should be crumpled paper.

Texture is the stuff that wraps around your major forms. Technically texture itself is made up of small forms, and the marks you see are all made up of the shadows cast by those forms (as mentioned in the pitfalls listed above), but they're at such a scale that they are not impacted by any sort of perspective distortion.

For example, *bricks* are not a texture. Bricks are at best, a pattern. The material of the bricks, however, with all their pocks and marks and grit, is certainly a texture. Similarly, *nose* is not a texture, but skin (complete with pores and hairs and zits and whatever else) is.

As you can see from this image, I've chosen some fried chicken. I got this reference image from the Epicurious recipe for Rosemary-Brined Buttermilk Fried Chicken. In case you're hungry.

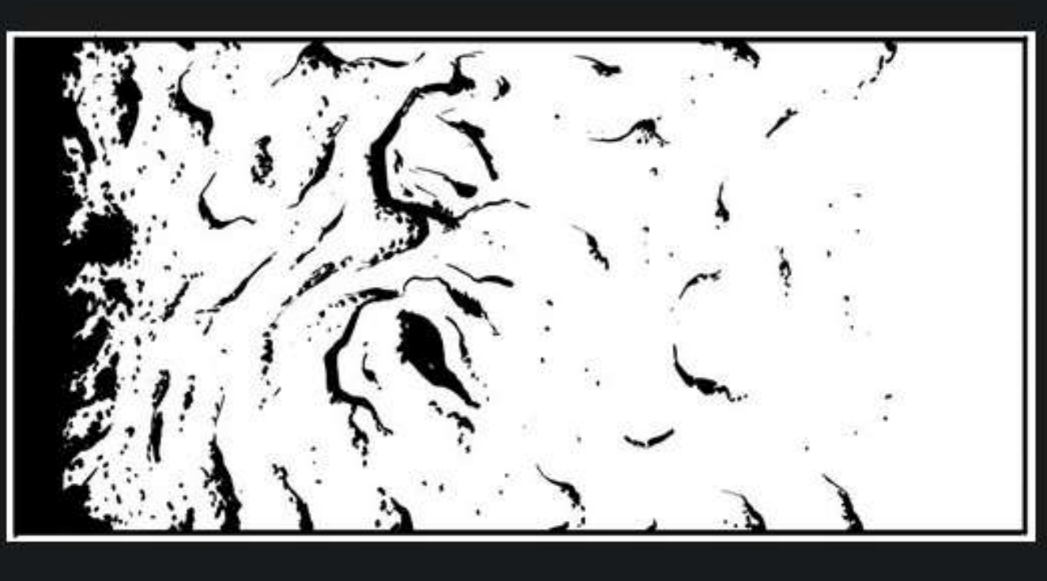


In the first square, we try to do a direct study from our reference. That is, we try and capture exactly what we see, down to all the finest detail. You should be focusing entirely on drawing the **shadows** you see, not outlining individual forms or drawing them directly.

Note: While this part of this exercise *is* about drawing everything observationally, this is as a step towards understanding the nature of the forms that are present, and how they relate to their surroundings. Later, when we get into drawing the texture gradient, we will be focusing instead on using that understanding in order to invent our own cast shadows for those textural forms, based on their relationship with whatever light source we put into place.

Take your time, study the reference image and zero in on specific details, then move to your drawing and put down only a few key strokes before returning to your image. Don't rely on memory, because our human memory is not trustworthy - it will oversimplify things very quickly, resulting in textures that feel cartoony.

As you do your study - or after completing it, whichever works best for you - take some notes down in the neighbouring square. These can consist of writing, drawings, etc. Try and distill the major aspects of what gives this texture its particular appearance.



This part is not to be done until you've done the last two steps for ALL ROWS ON YOUR PAGE. At this point, you should have gotten a decent amount of mileage purely observing and studying textures, now we get to learning how to organize it and use it for our own purposes.

The left side of the texture has a thick black bar on it. Imagine that the right side has an equally thick white bar, where no lines may be drawn. In between these two bars, I want you to use your texture to transition from black to white, left to right. I'd recommend starting towards the center, as this is where you're going to get the most detail due to the balance of light and dark. As you move to the left, let your shadows deepen and grow larger, and make sure they blend seamlessly into the black bar. As you move to the right, let your shadows get blasted out as they get closer to the light source, leaving only those in the deepest cracks where textural forms meet.

You will probably have the urge to outline the forms you see. Don't. We're not working in line at all, we are only drawing the shadows cast by the little forms that exist along the surface of our object.

The purpose of this exercise

This exercise has two major purposes - first, to get you to start thinking about how you observe and study your references, and second to get you to start working on how you organize that information. Learning this stuff generally works in those two phases - first you only really need to care about transferring information, building up an awareness of the shortcomings of human memory and how to work around that. Once that's under some degree of control, we start thinking about what information we actually need to be conveying to the audience to achieve our goals for a given drawing, focusing on which shadows to draw and where to place them.

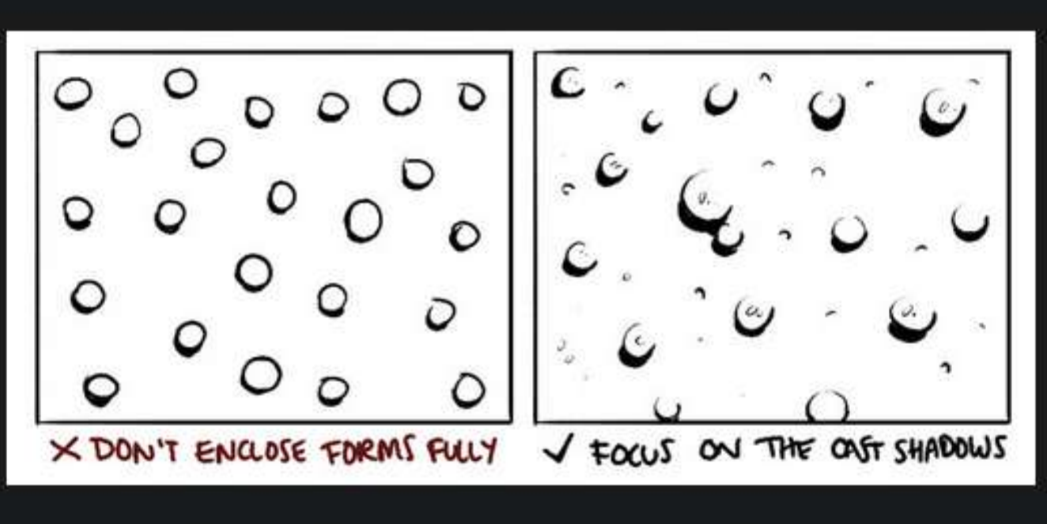
Mistake: Scribbling

✕ DO NOT SCRIBBLE!

This image is barely even necessary, but to put it simply - don't scribble. Don't rely on randomness or chaos. You may find a texture that feels like it's just a bunch of nonsense, crazy chaotic marks. It's not - it **never** is. There's always some sort of rhythm to them, a flow that they follow because that's how the physical world works. Even mussed up hair is going to flow in a particular fashion as the strands of hair group into shocks and clumps.

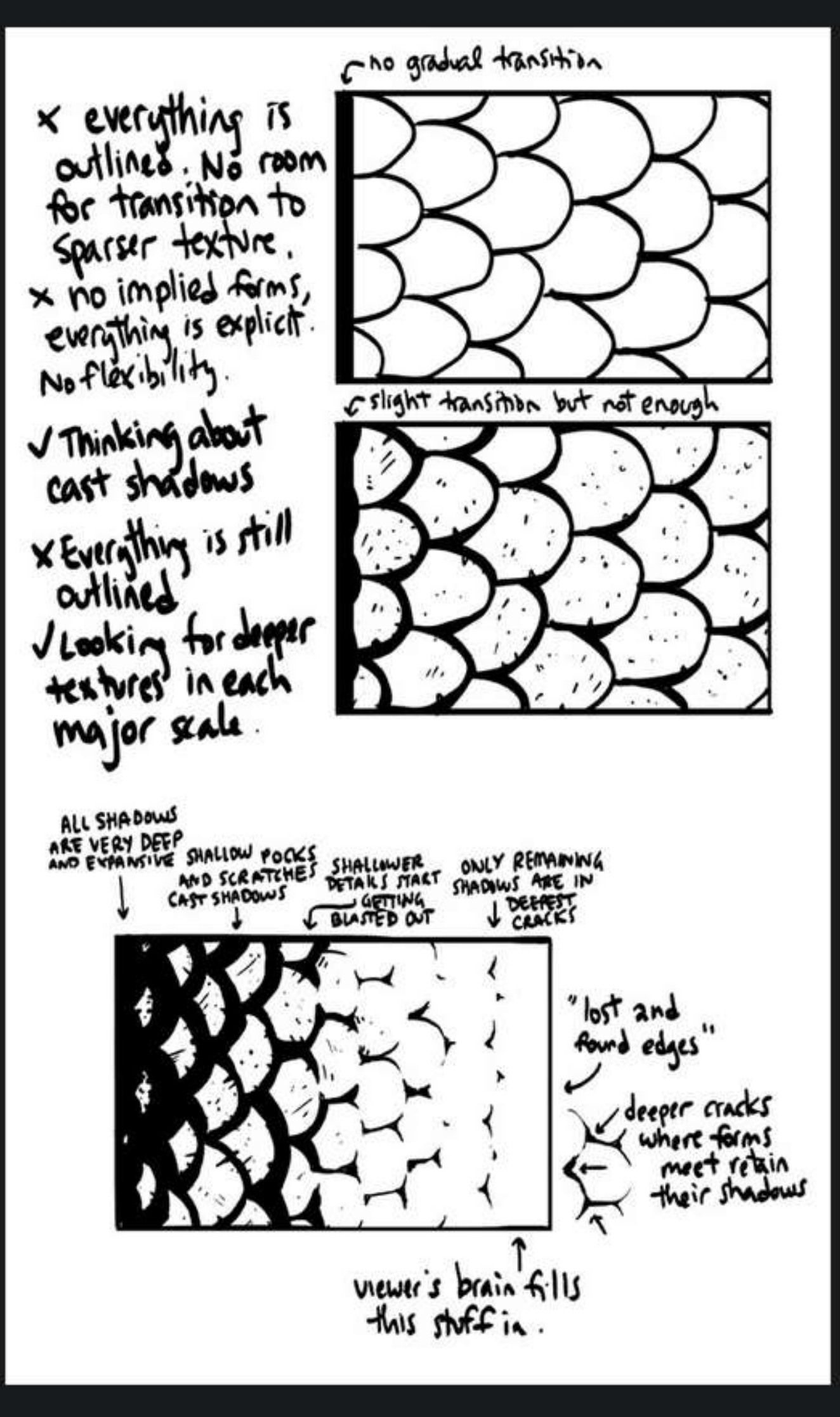
If you're about to scribble, stop and think. Go back to studying your reference, and look more closely.

Mistake: Drawing the forms of a texture



Textures are, as previously discussed, made up of little forms that exist along the surface of a larger one. Make sure you're not outlining and enclosing all of those forms however. Instead of drawing the forms themselves, you should be drawing the impact they have on their surroundings - that is, the shadows they cast.

Mistake: No transition from dense to sparse


no gradual transition
✕ everything is outlined. No room for transition to sparser texture.
✕ no implied forms, everything is explicit. No flexibility.
slight transition but not enough
✓ Thinking about cast shadows
✕ Everything is still outlined
✓ Looking for deeper textures in each major scale.
ALL SHADOWS ARE VERY DEEP AND EXPANSIVE
SHALLOW POCKS AND SCRATCHES CAST SHADOWS
SHALLOWER DETAILS START GETTING BLASTED OUT
ONLY REMAINING SHADOWS ARE IN DEEPEST CRACKS
"lost and found edges"
deeper cracks where forms meet retain their shadows
viewer's brain fills this stuff in.

The biggest challenge for those who are new to texture is breaking away from using lines to enclose and outline their textural forms.

It's important to realize that lines don't actually exist - they're a tool we employ, and they are very effective at demonstrating the borders between the volumes of our forms. They work very well when dealing with general construction, but once we get into situations where we have a lot of tiny forms that run along the surface of our major constructed forms, this tool becomes much less effective. It can quickly result in a lot of lines crammed close together, creating high contrast, visually noisy areas that turn into unintended focal points that draw the viewer's eye. Of course, we've discussed this previously - the solution is to rely on cast shadows instead.

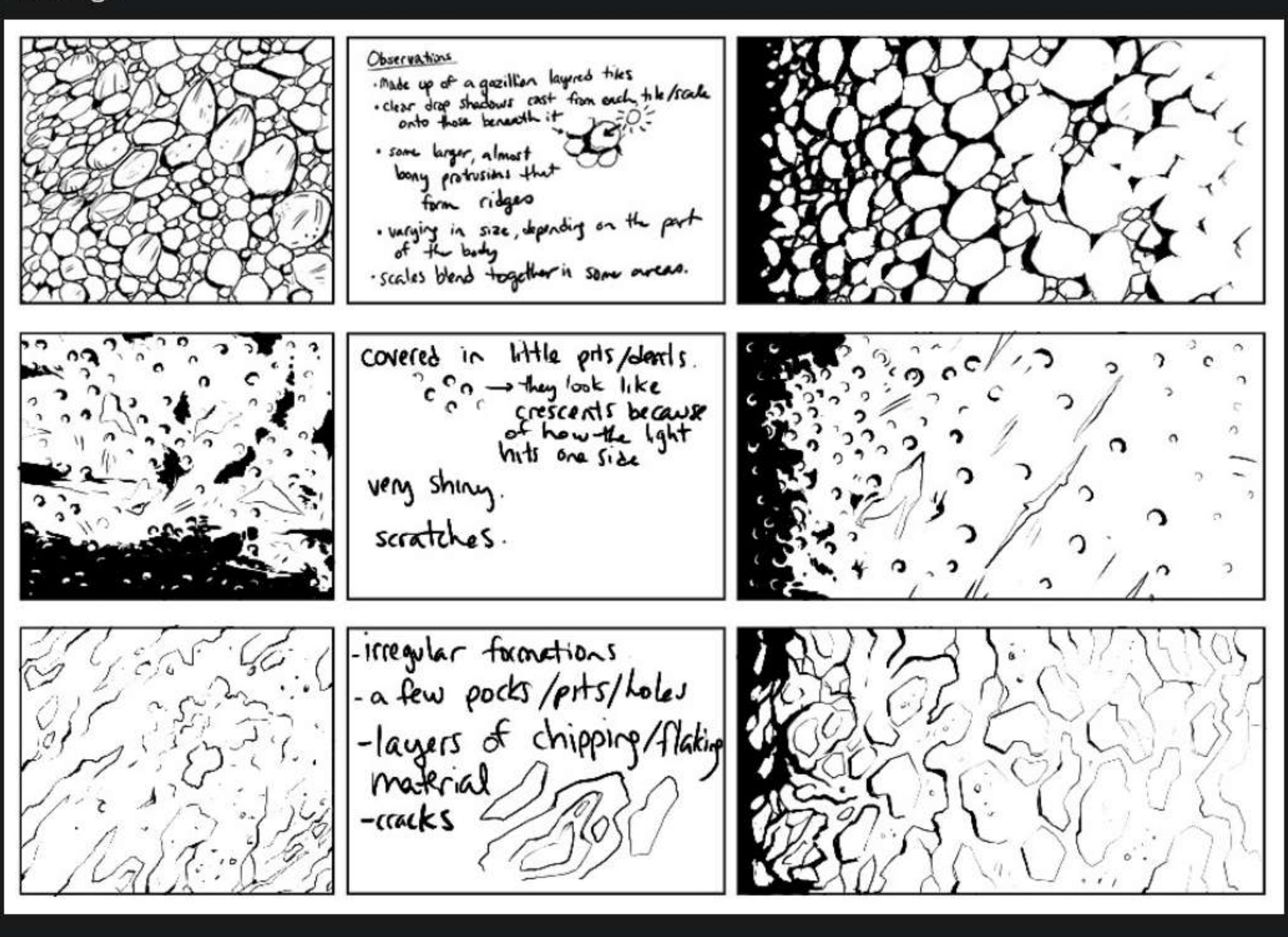
This doesn't mean drawing in our textural forms with line first, *then* applying shadows. It means relying purely on shadows only, and allowing there to be edges that get lost and found throughout our texture. This happens because the shadows where two forms meet (like two scales coming together) will generally be much deeper, since light has more difficulty penetrating these crevasses. As the amount of light increases, the shadows on external edges will disappear much sooner than those in these deeper cracks, causing those edges to get *lost* and then be *found* once again.

This is extremely useful, because it allows us to punch gaps in our textures, providing a means to transition from densely packed areas of black ink, to areas that are mostly just left blank.

Additionally, using this approach allows us to imply a lot more information without actually having to draw it all. As we move further to the right side where the texture is left sparse, the viewer's brain will fill in most of the detail there. If instead we were to outline everything in its entirety, we'd be telling the viewer that every single piece of information that has been drawn exists, and that there is nothing that exists that has not been drawn. There is no room left for implied detail - everything is instead entirely explicit. That is an inflexible way of working, and should be avoided.

Example Homework

Once you're done, this is roughly what you should be looking at. Do not worry about whether or not you're *getting it*. This is just the start, to get you thinking about how you go about observing and studying your reference, and how you organize the information in your head before using it in your drawings.


Observations
- Made up of a gazillion layered tiles
- clear drop shadows cast from each tile/scale onto those beneath it
- some larger, almost bony protrusions that form ridges
- varying in size, depending on the part of the body
- scales blend together in some areas.
covered in little pits/dents. → they look like crescents because of how the light hits one side
very shiny.
scratches.
- irregular formations
- a few pocks/pits/holes
- layers of chipping/flaking material
- cracks

Resources

Everything has a texture, but some people do find it a little challenging at first to recognize this, and as such you may struggle with finding resources to work from. As a starting point, you can use this pinterest board by Ryan Malm. Alternatively, I always find google image search to be particularly useful, especially due to the *Search Tools* where you can limit your search to high resolution results.

<<< Texture and Detail

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

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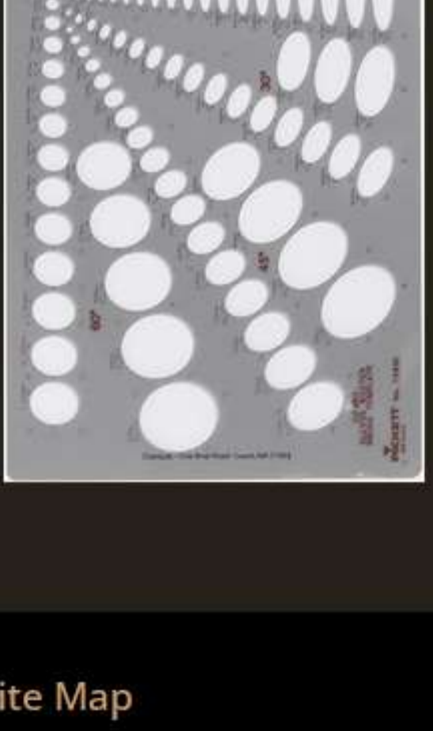

Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.

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Lesson 2: Contour Lines, Texture and Construction

Dissections

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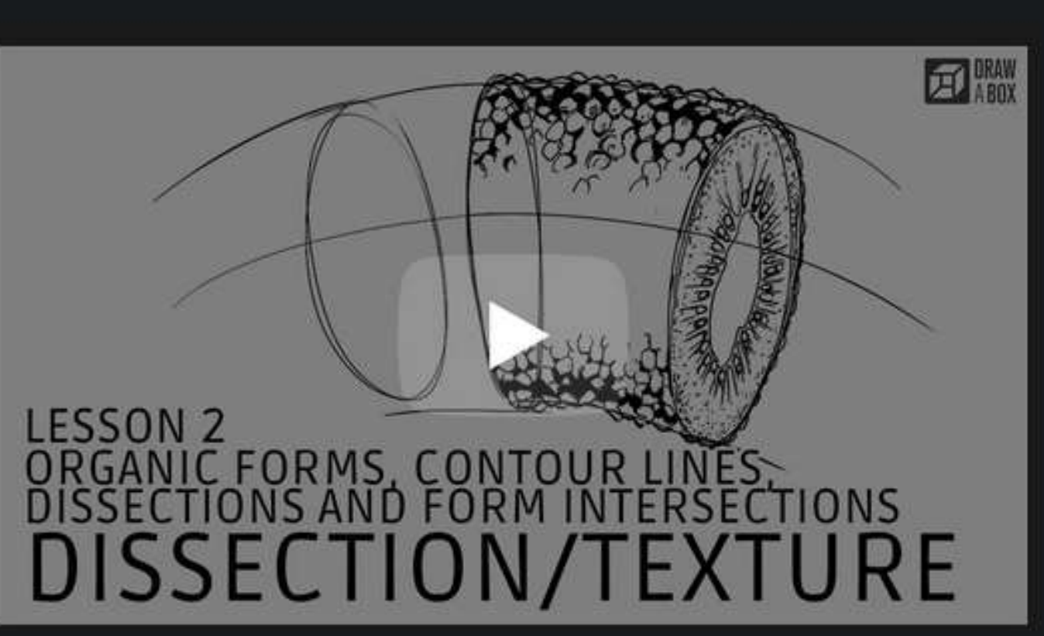

LESSON 2
ORGANIC FORMS, CONTOUR LINES, DISSECTIONS AND FORM INTERSECTIONS
DISSECTION/TEXTURE

While we've had some exposure to texture now with the texture analysis exercise, we're not really expected to have any kind of mastery or even comfort with it. All the same, we're going to jump into the next step - unwrapping a texture from a reference image and then applying it to a completely different object.

Many of the same challenges as the previous exercise come into play, but now we also have to deal with the curvature of these simple sausage forms, as well as an opportunity to make use of the form's silhouette to convey information.

Apply the approaches from the texture analysis exercise

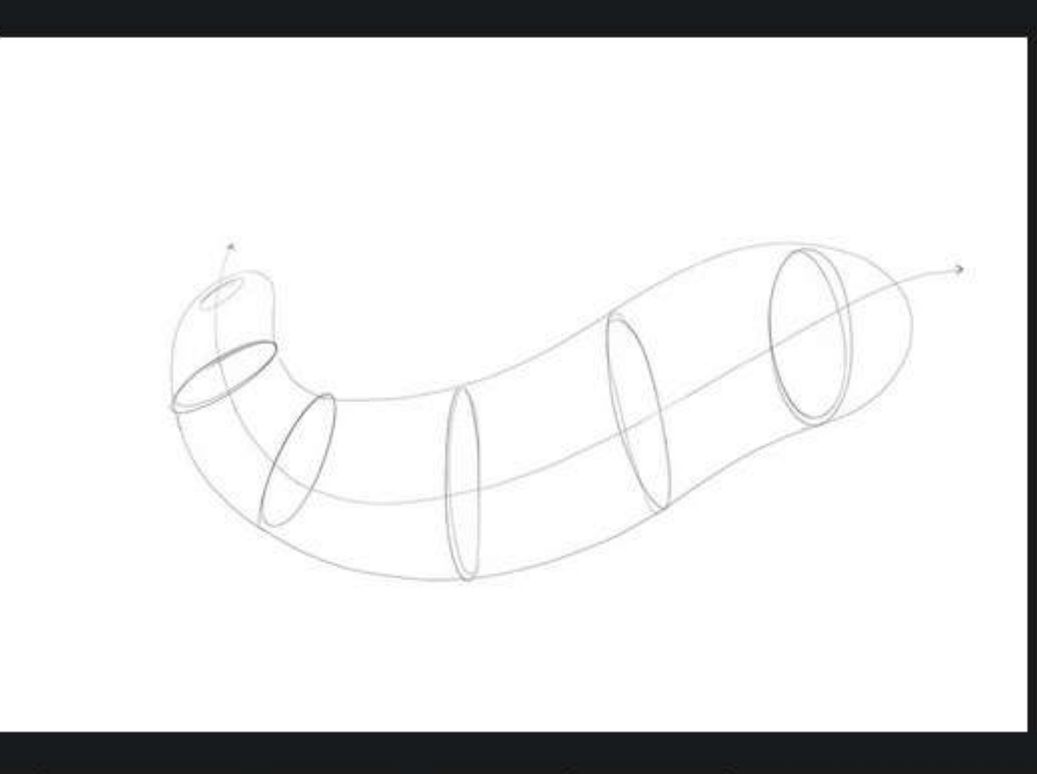
As many of you know, Drawabox is an evolving course that improves as I develop a better understanding of what I'm trying to explain. Texture is definitely an area where over time my explanations have improved - and while we're currently working through a gradual overhaul of the entire course from start to finish to eliminate any contradictions, this one can definitely be a source of confusion.

To put it simply, the demo/examples for this exercise are old, and still includes things like outlining textural forms, capturing local surface colour, and so on - things that the newer texture analysis exercise, with its focus on implicit markmaking and cast shadows specifically says not to do.

The demos are still useful, but until our overhaul is able to reach this point, just keep in mind that you should continue to apply the principles from the texture analysis to the best of your ability.

So, as a reminder:

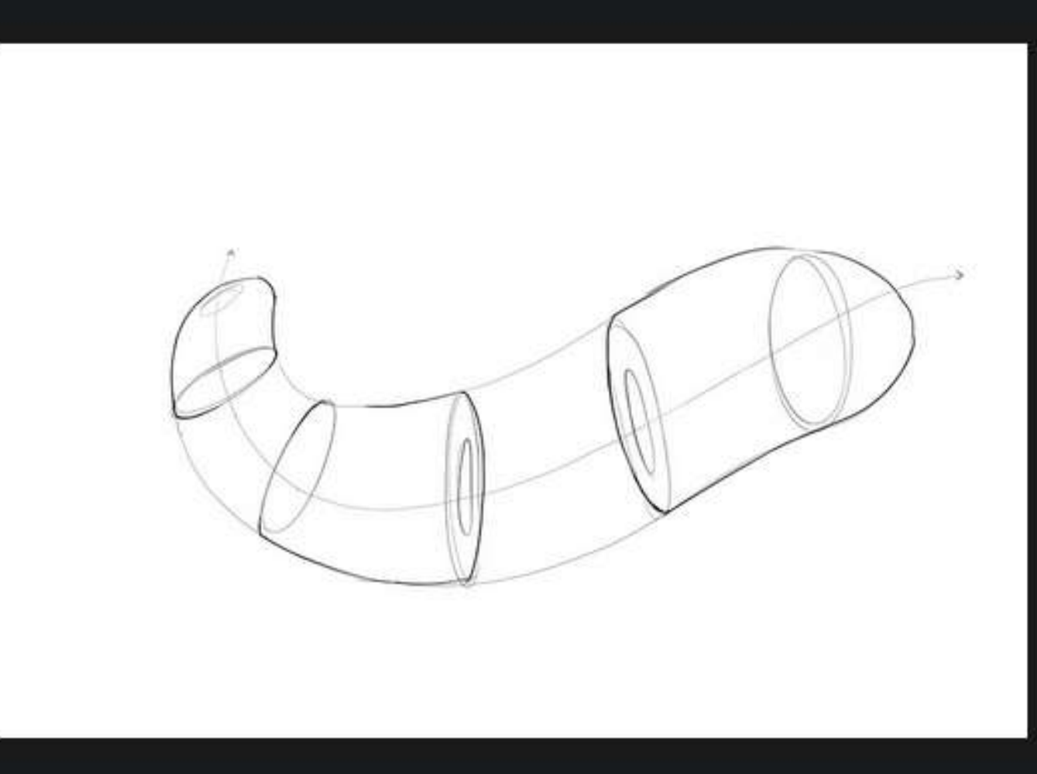
- Don't outline your textural forms (except when they break the form's silhouette)
- Focus on implying the presence of the textural forms by designing the shadows they cast (which you'll create based on your understanding of how those individual forms sit in 3D space, rather than copying them straight out of your reference)
- Ignore local/surface colour - doesn't matter if something is green or red or yellow, or light or dark. All we're capturing is information that helps us understand the 3D qualities of the surfaces, conveying to the viewer what it would feel like to run their fingers over its surface.



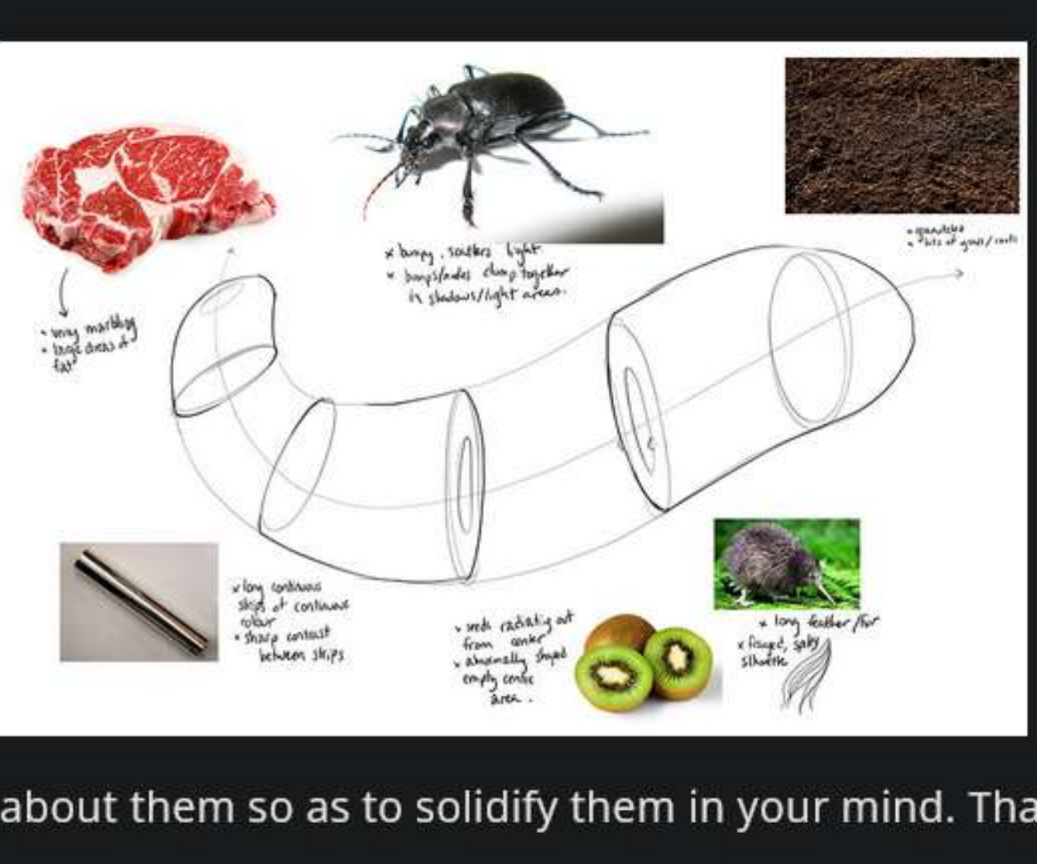
You start off with an organic form with contour lines. It's important that you don't start off with any particular design or object in mind.

You can go ahead and use your pages of organic forms with contour ellipses/curves for this, just make sure you take pictures or scans of them first for the purpose of having others review it.

Alternatively, you can create new pages of them, but I want you to construct the forms without any changes. No trying to hide your contour lines or be extra clean - the textures are going to go right over these construction lines.

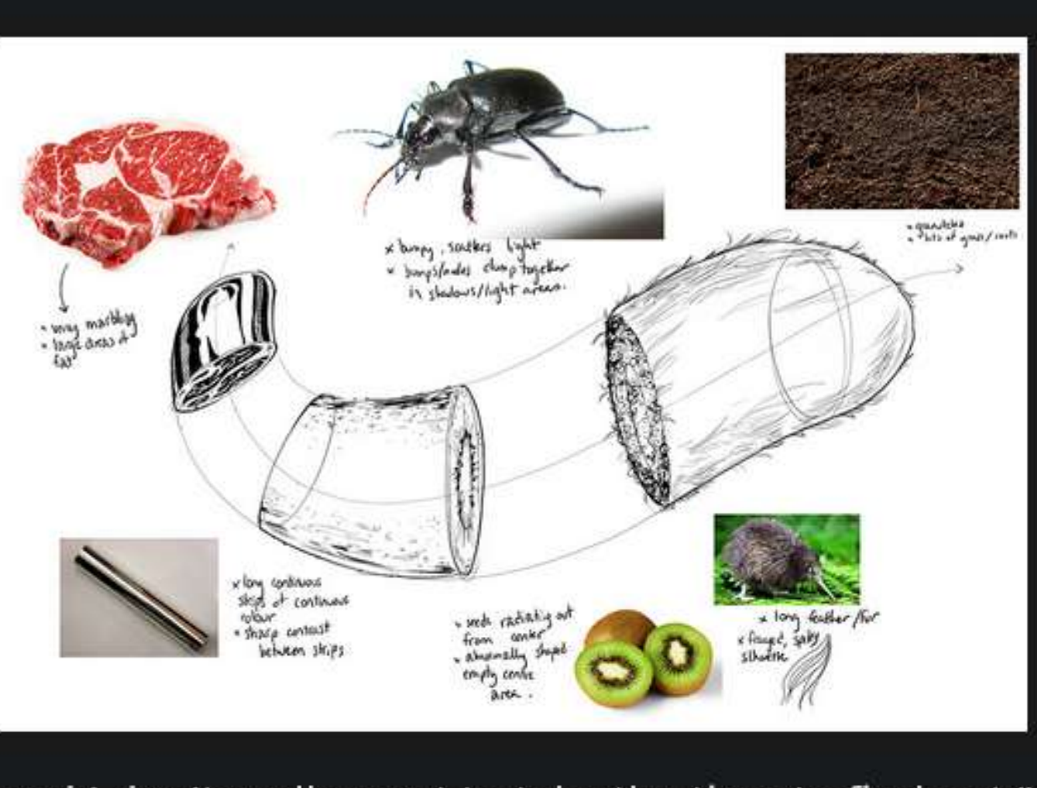


Pick a section of your organic form, between two contour lines. This section will be your point of dissection - imagine that you've cut it out and removed it, and add a bit of line weight/thickness to the edges to emphasize that they are the edges of the forms, and that the section between them has been cut away.



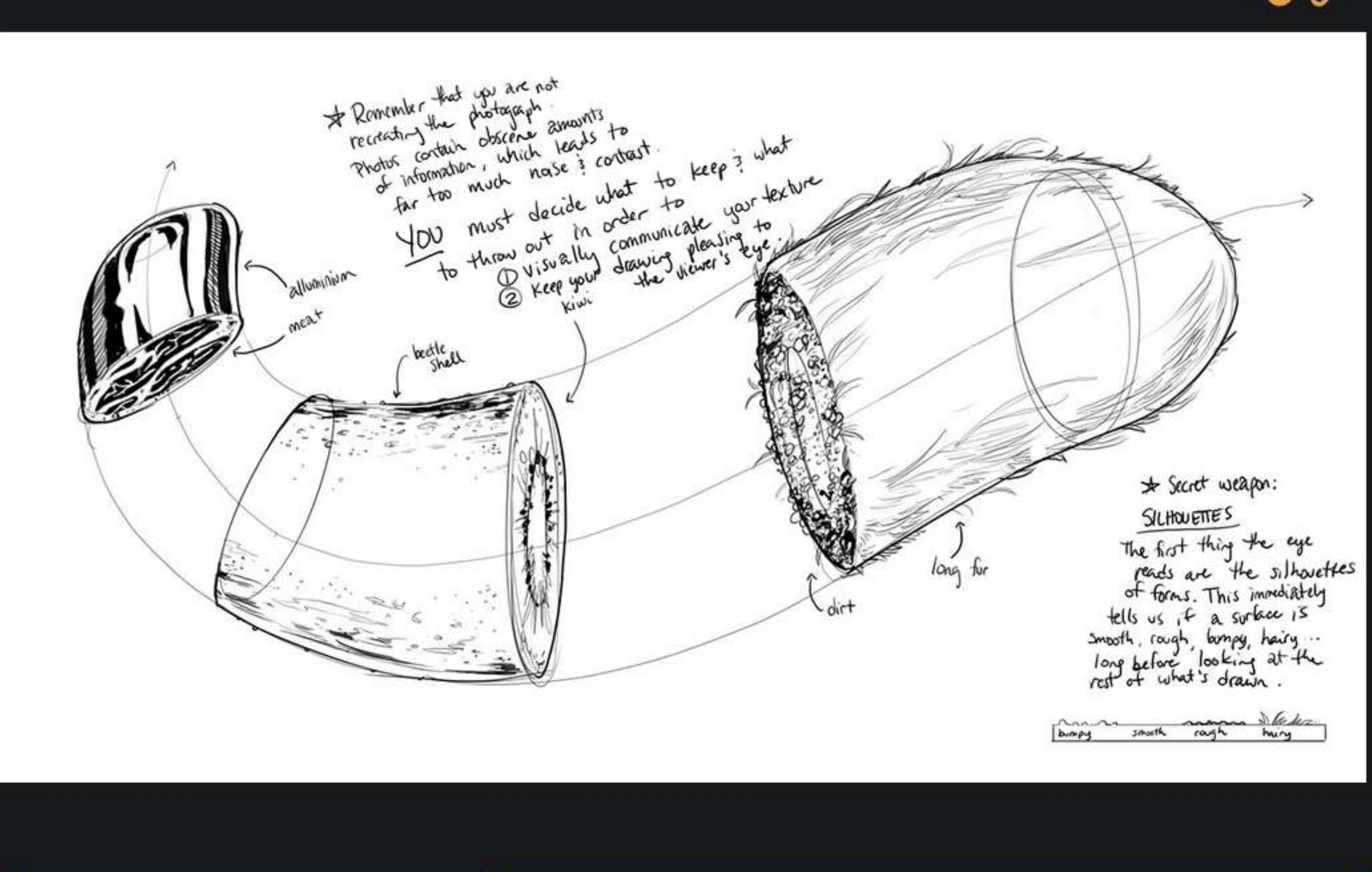
Now... stop. Put your pen down. Go find photo reference, or live objects you can look at and study. I've received plenty of homework submissions where people try to use their imagination for this step, and quite frankly it never turns out well. Reason being, your imagination - or what we call your "visual library" - is empty right now. You don't fill it by just knowing certain things exist. You fill it by actively studying those objects, analyzing them in detail and then applying what you've learned about them so as to solidify them in your mind. That's what this exercise does.

So, grab some photos of objects with interesting textures - anything will do, because literally any and every object has a texture to it. Next, look at the texture closely and identify what characterizes it - start by noting the major visual elements (bumps, spots, scales, any sort of visual aspect that you see repeated in a pattern). Then identify how those elements are organized - are they spread out evenly over the surface, or are they grouped together, or do they merge to form larger clumps?



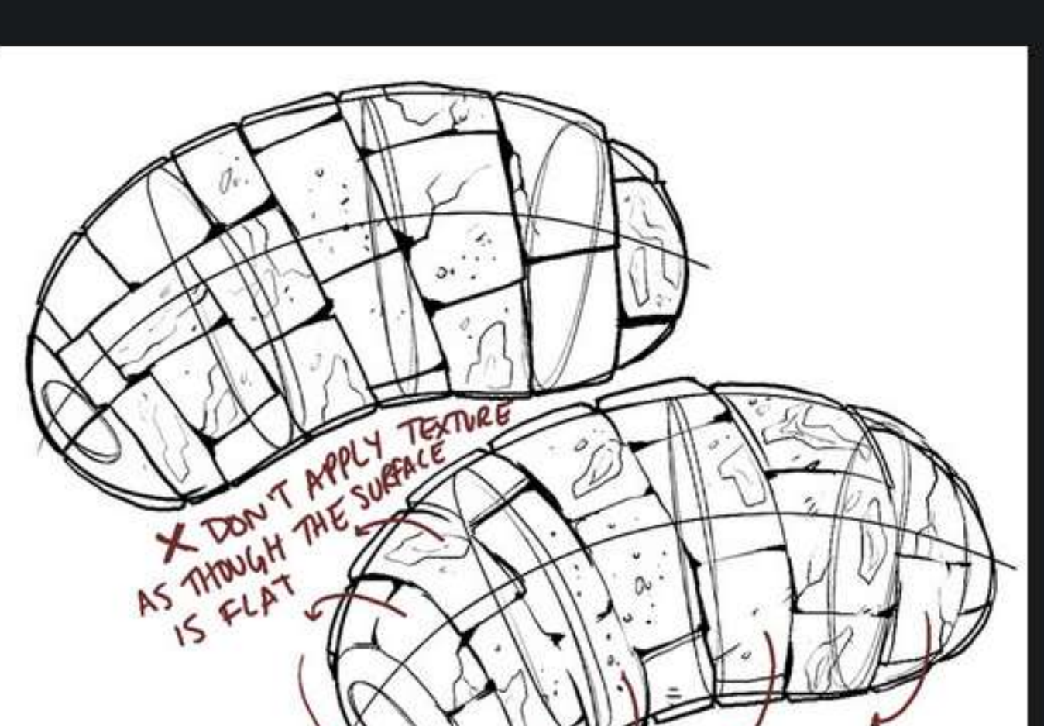
Every texture follows a rhythm - randomness does not exist. At its surface, something may appear random, but if you look deep enough, you'll always find some manner of organization and structure. **Never scribble or draw randomly**. It simply won't look good or capture the texture you're after. Furthermore, refrain from using hatching lines, as they generally aren't present in most natural materials. More often than not, people just use hatching lines as a shorthand for "I have no idea what goes here and I don't really want to take the time to find out."

Lastly, draw your textures to various parts of the organic form. Remember that you're transferring texture only - leave any form information behind.


★ Remember that you are not recreating the photograph. Photos contain obscene amounts of information, which leads to far too much noise & contrast.
YOU must decide what to keep & what to throw out in order to
① visually communicate your texture
② Keep your drawing pleasing to the viewer's eye.
aluminium
meat
beetle shell
kiwi
dirt
long fur
★ Secret weapon: SILHOUETTES
The first thing the eye reads are the silhouettes of forms. This immediately tells us if a surface is smooth, rough, bumpy, hairy... long before looking at the rest of what's drawn.
bumpy
smooth
rough
hairy

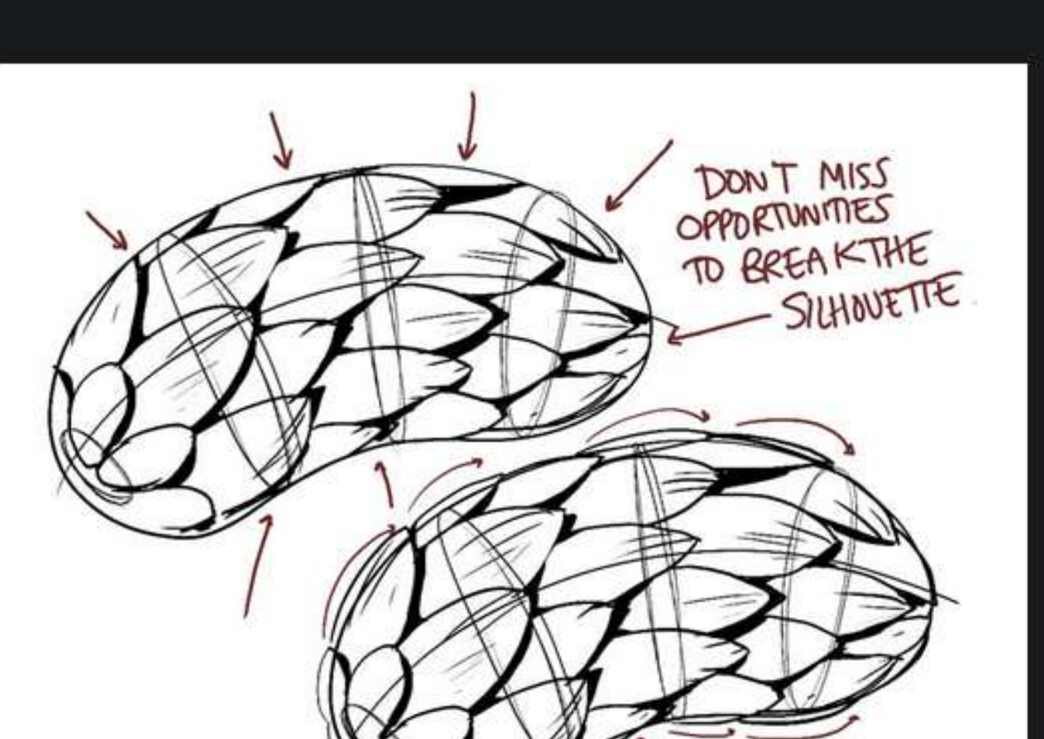
The purpose of this exercise

The purpose is honestly simple. It's not for you to amaze people with your texturing skills, or even to test you. It's just to get you working with observation, to start thinking about the differences between looking at something and actually studying it. I have no expectations of you being able to pull off amazing textures right now. If you can, that's great. If you can't, you're going to have plenty of time and many opportunities to continue to work on it.


✗ DON'T APPLY TEXTURE AS THOUGH THE SURFACE IS FLAT
THE SURFACE IS CURVED

Mistake: Not minding the curvature

A lot of students make this mistake at first - they'll get so caught up in the texture they're trying to draw that they'll forget about how the surface they're covering actually turns in space. These organic forms are indeed curved, so you need to ensure that the texture gets compressed and warped along the sides as the surface turns away from the viewer.


DON'T MISS OPPORTUNITIES TO BREAK THE SILHOUETTE

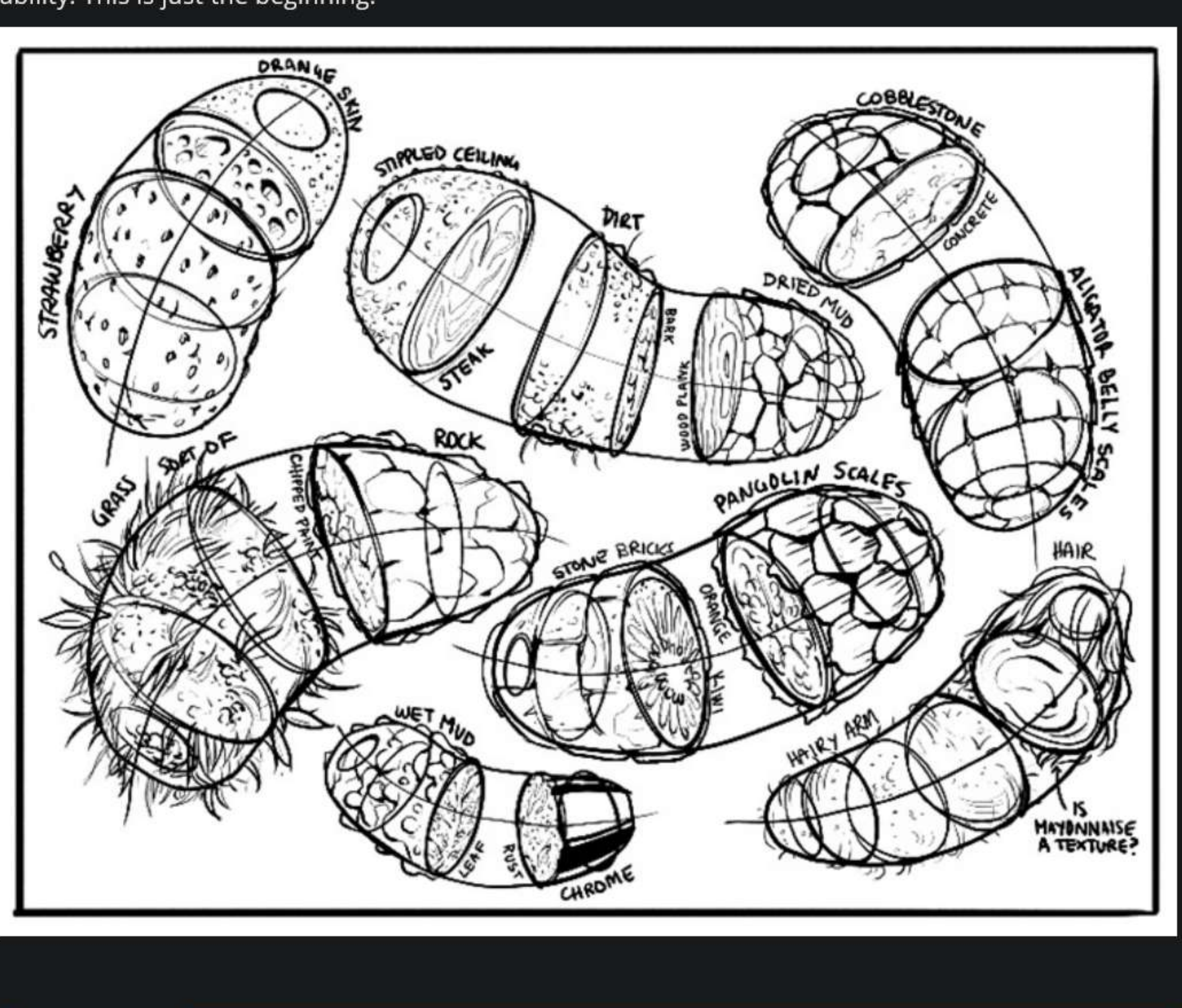
Mistake: Not breaking the silhouette

Students are also sometimes afraid to break past the silhouette, so they'll do lovely work within the simple sausage form, but they'll miss the opportunity to push past it and really bring their texture into its own.

Remember that punching through the silhouette and providing information there at the edge is going to have the biggest impact. You could fill the whole silhouette in with black and it'll still communicate a great deal - that's how important this kind of technique is.

Example homework

Here's an idea of what a finished page *might* look like. Alternatively, it might look like a steaming pile of crap, and that's totally fine as well. Just complete the required number of pages to the best of your ability. This is just the beginning.



Resources

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<<< Texture and Detail

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They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

Faber Castell PITT Artist Pens

Like the Staedtlers, these also come in a set of multiple weights - the ones we use are F. One useful thing in these sets however (if you can't find the pens individually) is that some of the sets come with a brush pen (the B size). These can be helpful in filling out big black areas.

Still, I'd recommend buying these in person if you can, at a proper art supply store. They'll generally let you buy them individually, and also test them out beforehand to weed out any duds.

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- Constructional Drawing
- The process
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Lesson 2: Contour Lines, Texture and Construction

Construction

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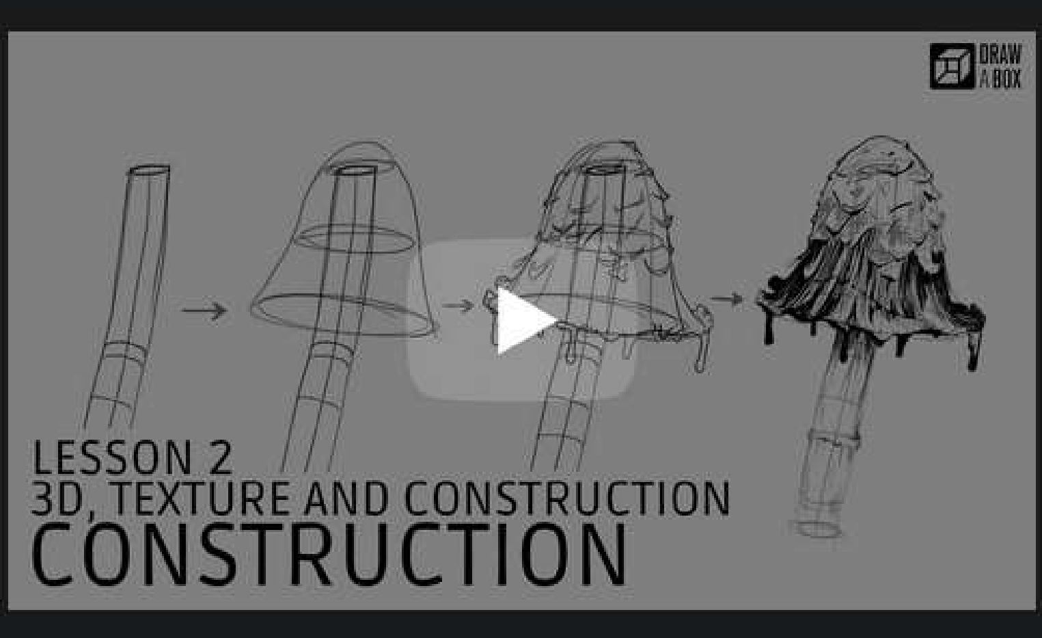
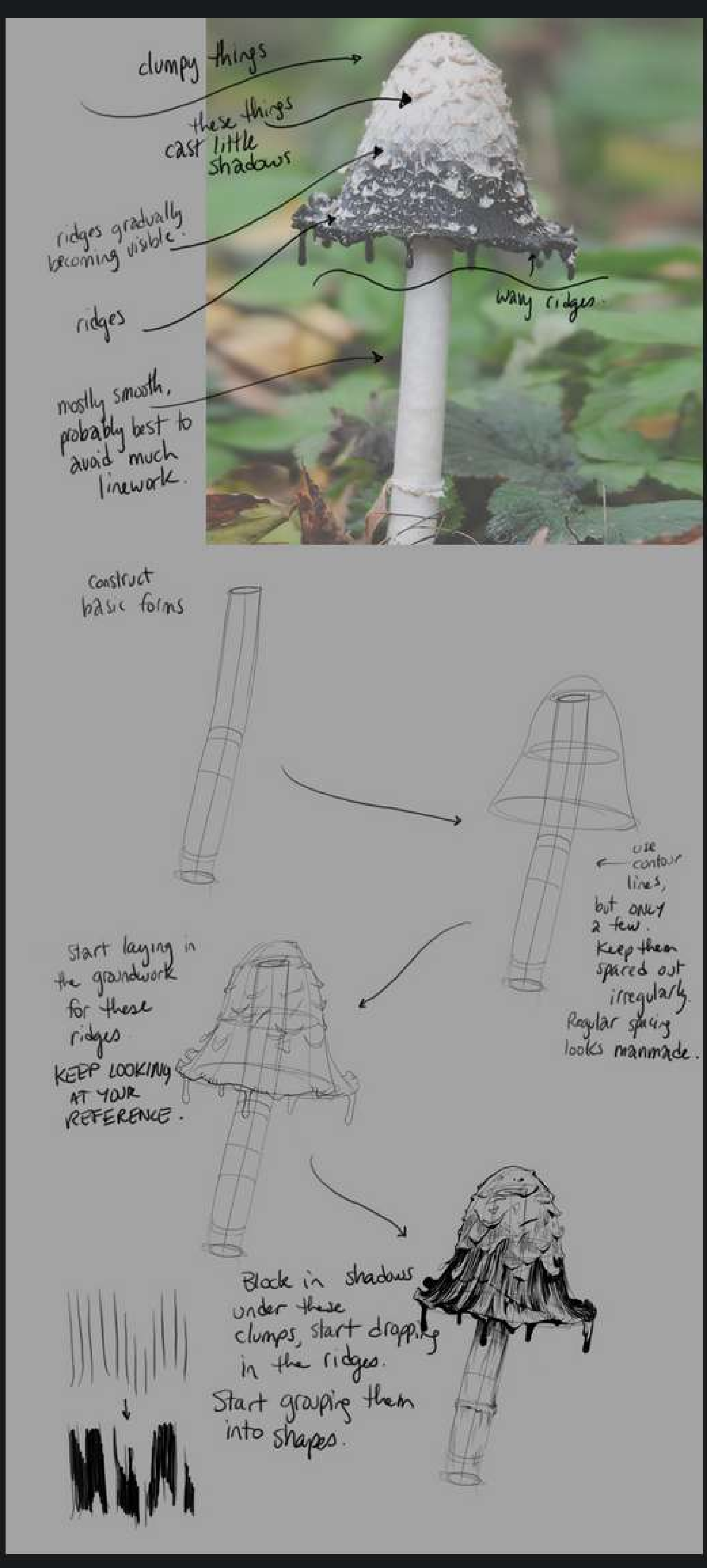


Constructional Drawing

These first two lessons have mostly focused on techniques we can employ to make specific marks, to build solid forms, and to reinforce and better understand how those forms sit in space. As we come to the end of *the basics* however, I want to introduce the technique that will be at the core of the next several lessons, along with a couple of exercises to get you started.

To put it simply, constructional drawing is a process used when drawing an object that involves breaking that object down into its simplest components, usually simple forms, then reconstructing those components on the page. With that simple, solid structure and scaffolding present on our page, we build over it, increasing its complexity in successive passes, and eventually reproducing the object.


clumpy things
these things cast little shadows
ridges gradually becoming visible
ridges
wavy ridges
mostly smooth, probably best to avoid much linework
construct basic forms
use contour lines, but only a few. Keep them spaced out irregularly. Regular spacing looks manmade.
Start laying in the groundwork for these ridges
KEEP LOOKING AT YOUR REFERENCE.
Block in shadows under these clumps, start dropping in the ridges.
Start grouping them into shapes.

The process

The process is as follows:

1. **Observe your subject**, whether it's from life or a photograph. Don't focus on the detail, instead try and strip it away in your mind and identify the basic forms that exist. First look for geometric forms, like boxes, cylinders, etc. Next look for organic forms - sausages, ball-like masses, etc (these are still relatively simple). Last of all, look for flat forms - think about the ribbon/arrows from lesson 2, which are flat, but twist and turn in 3D space.
2. **Identify your subject's basic construction**. Think about how all of the components in the previous step relate to each other in 3D space. Think about where they connect to one another, how they intersect, and generally how they come together to create the structure of your object.
3. **Rebuild this construction on the page**. In the first two lessons and the box/cylinder challenge, we look at how to draw the basic building blocks, and how to rotate them arbitrarily in 3D space. Using this knowledge, construct what you've identified in the previous step in your drawing. Remember that you're not drawing the object right now, you're drawing a construction. Ignore detail, ignore complexity, just focus on that simple construction.
4. **In successive passes, build up the level of complexity**. You have a basic construction down - this serves as the foundation for more forms and more complexity. Any additional forms you add to your drawing must be supported by what is already there. I like to think of it like a building. You don't immediately jump in and pile up your bricks til you reach the sky, you build a foundation, then the load-bearing supports, then you create a scaffolding, and so on. Each one is a new pass where more information is added to the drawing. Make sure that before you move onto the next pass, that what you have on the page feels solid and three dimensional. Don't move forward with things that feel flat and flimsy.

Observation vs construction

Often when I see students discussing different approaches to drawing, observational drawing and constructional drawing are presented as a sort of dichotomy - two techniques that are mutually exclusive. This really isn't true. Constructional drawing inherently incorporates observation, as we cannot know which simple forms to start with unless we observe our subject matter carefully. Observational drawing *can* be done without construction, but if you ask me, that is an approach that is fundamentally incorrect.

Construction is all about understanding how an object exists in 3D space as a part of the drawing process. If you are doing this - even if not as explicitly as we do here - you are employing an element of construction.

If, however, you are working only in two dimensions - for example, drawing from a photo reference (photographs are by nature two dimensional) and reproducing it in your drawing directly without considering the fact that the photo represents a three dimensional scene, then there is no component of construction and in all likelihood your drawing will appear flat and unconvincing. Yes, you may eventually become an exceptional photocopier, but we do have machines for that already, and the applications for that skill set are fairly limited these days.

This is why if you have learned any observational drawing in the past, you may have heard discussion over whether or not it is okay to use photo references, or if only drawing "from life" (with the actual object in front of you) is valuable. In my experience, this is because it is considerably more difficult for a beginner to look at an actual three dimensional object without some degree of understanding or consideration for how it sits in 3D space. You're effectively forced to somehow process that 3D object into your 2D drawing.

I have generally found that when employing constructional techniques, like those taught here, it doesn't matter *as much* whether you draw them from life or not. There are still benefits to drawing an object from life, and if you have the means or the opportunity you absolutely should do so, but these techniques do help significantly reduce the pitfalls that come from working with 2D references.

A technique for learning

I do want to make one thing very clear - while constructional drawing is an extremely effective technique for drawing, we are using it primarily as a learning tool. I want to address this because a lot of students see the drawings resulting from your lessons and the first thing that pops into their mind is, "Well that's got too many lines!"

It absolutely does! But don't think for a second that because *you* want your drawings to be cleaner, that you should modify the approach in order to either try and hide your strokes (by making them fainter), or skip over lines that may be important, but that you feel you can do without. **You absolutely should not**. The goal for all of the constructional drawing lessons is not to produce pretty drawings you can pin on your fridge or display at a gallery (although constructional drawing does result in a rather pleasing aesthetic in my opinion, that's an irrelevant side-effect).

These extra lines serve a purpose - they're there to help you continue to develop your understanding of 3D space, of how to build up your constructions from the simple to the complex, and to help reinforce your own belief that you are creating solid three dimensional objects in a 3D world - not drawing lines on a page.

Eventually you will internalize this understanding. They're not training wheels that you'll need to take off at some point, they're simply exercises that will inherently improve your spatial reasoning as a whole. This is also why it's important to continue drawing for the fun of it alongside your exercises - that is, drawing without the intention of growing and learning. It gives you the opportunity to see how your approaches and general understanding develops, while applying it naturally to the areas of your interest.

Homework and exercises

Every Drawabox lesson consists of lecture content and exercises that are assigned as homework. It's best to complete this homework before moving onto the next section. As this lesson consists of three sections (thinking in 3D, texture, construction), it is best that you **only submit your work for review when you've completed all three**.

We're not getting into actual constructional drawing yet. These exercises are going to focus on your ability to combine different forms in 3D space, which is the last step before actual construction. The main difference here is that we're not trying to build up to a specific result.

The homework assignment for this section is as follows:

- 4 filled pages of the Form Intersections exercise. **The first page should consist only of boxes**.
- 2 filled pages of the Organic Intersections exercise

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here.

<<< Texture and Detail

Applying Construction to Plants >>>

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

Drawabox-Tested Fineliners (Pack of 10, $17.50 USD)

Let's be real here for a second: fineliners can get pricey. It varies from brand to brand, store to store, and country to country, but good fineliners like the Staedtler Pigment Liner (my personal brand favourite) can cost an arm and a leg. I remember finding them being sold individually at a Michael's for $4-$5 **each**. That's highway robbery right there.

Now, we're not a big company ourselves or anything, but we have been in a position to periodically import large batches of pens that we've sourced ourselves - using the wholesale route to keep costs down, and then to split the savings between getting pens to you for cheaper, and setting some aside to one day produce our own.

These pens are each hand-tested (on a little card we include in the package) to avoid sending out any duds (another problem with pens sold in stores). We also checked out a handful of different options before settling on this supplier - mainly looking for pens that were as close to the Staedtler Pigment Liner. If I'm being honest, I think these might even perform a little better, at least for our use case in this course.

We've also tested their longevity. We've found that if we're reasonably gentle with them, we can get through all of Lesson 1, and halfway through the box challenge. We actually had ScyllaStew test them while recording realtime videos of her working through the lesson work, which you can check out here, along with a variety of reviews of other brands.

Now, I will say this - we're only really in a position to make this an attractive offer for those in the continental United States (where we can offer shipping for free). We *do* ship internationally, but between the shipping prices and shipping times, it's probably not the best offer you can find - though this may depend. We also straight up can't ship to the UK, thanks to some fairly new restrictions they've put into place relating to their Brexit transition. I know that's a bummer - I'm Canadian myself - but hopefully one day we can expand things more meaningfully to the rest of the world.

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Form Intersections

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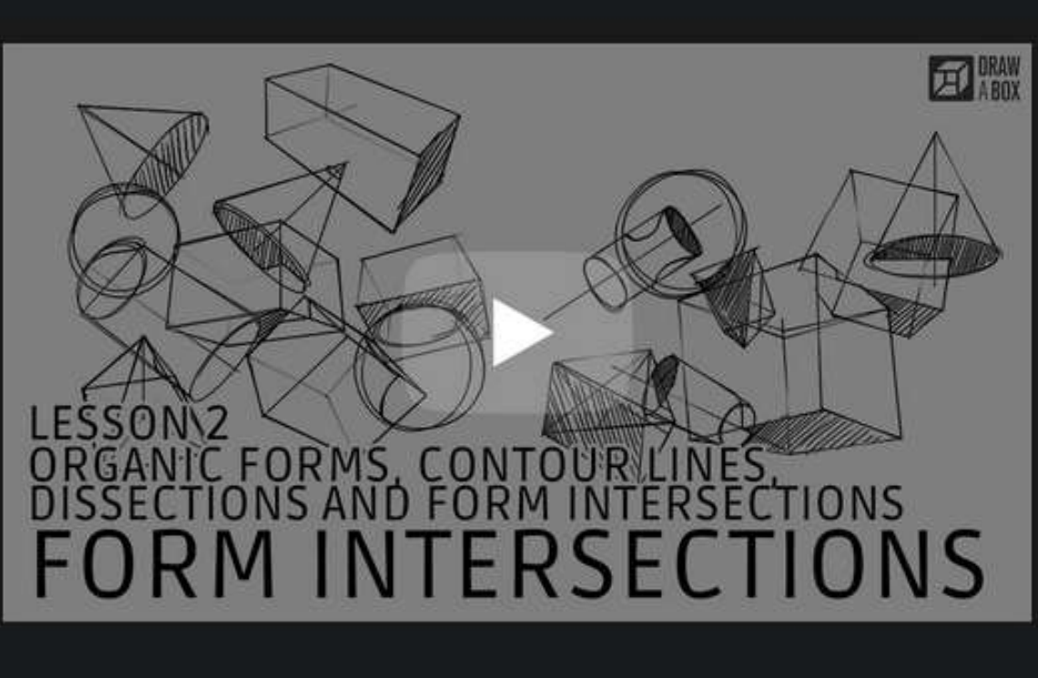
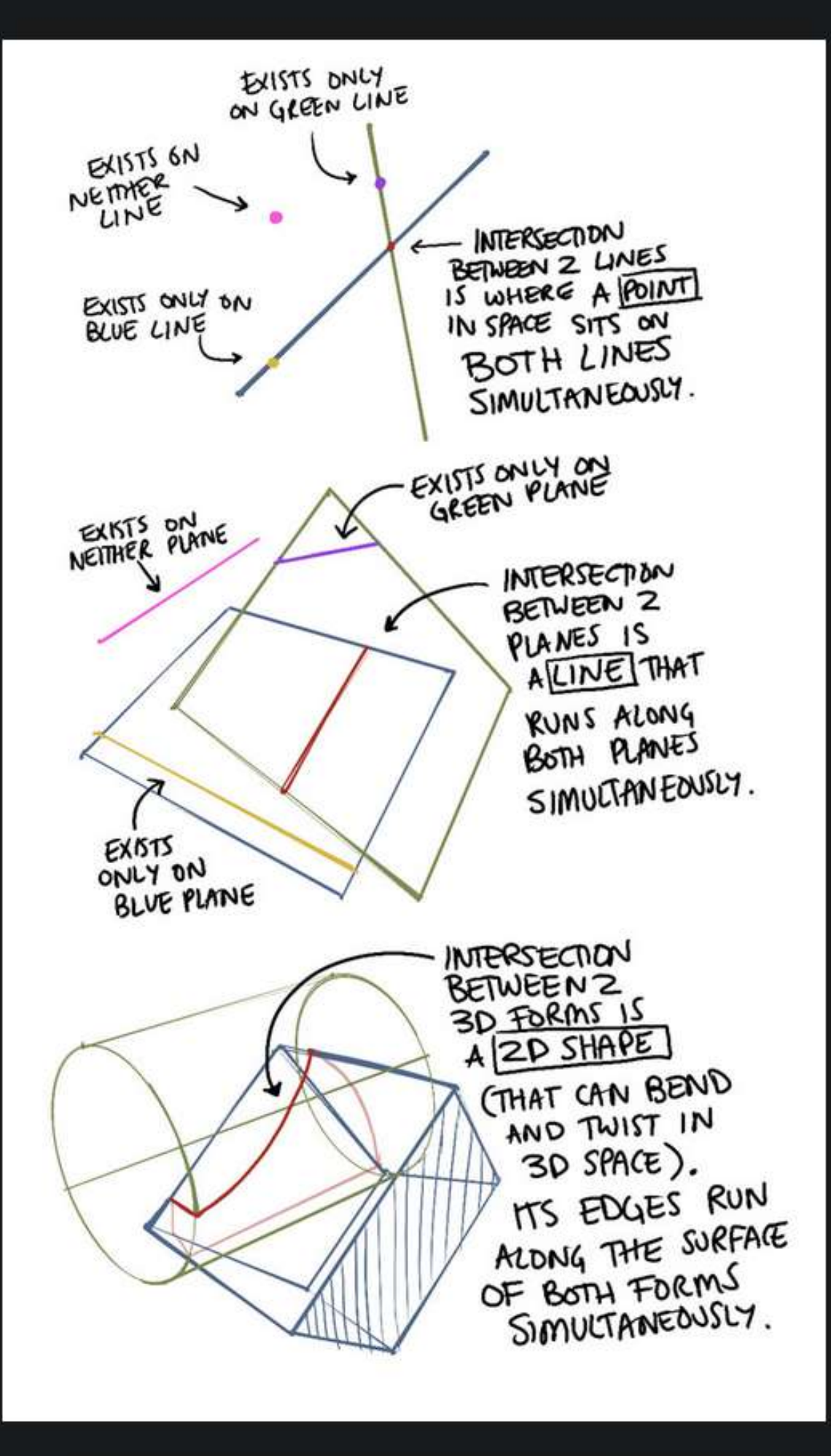

LESSON 2
ORGANIC FORMS, CONTOUR LINES, DISSECTIONS AND FORM INTERSECTIONS
FORM INTERSECTIONS

Similar to the rotated boxes and organic perspective boxes exercises, this one is challenging, and is meant to be. While the name suggests that we're focusing on your ability to handle the intersections between the forms, that's icing on the cake, and I expect that you will struggle with it.

What I'm interested in most of all is your ability to draw these forms as being solid, within the same space, in a way that feels cohesive and consistent.

Before we start, here's a hint: **stick to equilateral forms**. That is to say, try and keep your forms roughly equal in all their three dimensions: length, width, height, and avoid any that are overly stretched in any one of these. This will keep dramatic perspective distortion out of the equation, so we can focus on the core of the exercise.

Understanding how forms intersect


EXISTS ONLY ON GREEN LINE
EXISTS ON NEITHER LINE
INTERSECTION BETWEEN 2 LINES IS WHERE A POINT IN SPACE SITS ON BOTH LINES SIMULTANEOUSLY.
EXISTS ONLY ON BLUE LINE
EXISTS ONLY ON GREEN PLANE
EXISTS ON NEITHER PLANE
INTERSECTION BETWEEN 2 PLANES IS A LINE THAT RUNS ALONG BOTH PLANES SIMULTANEOUSLY.
EXISTS ONLY ON BLUE PLANE
INTERSECTION BETWEEN 2 3D FORMS IS A 2D SHAPE (THAT CAN BEND AND TWIST IN 3D SPACE). ITS EDGES RUN ALONG THE SURFACE OF BOTH FORMS SIMULTANEOUSLY.

Before we actually get to the exercise itself, we're going to discuss how forms intersect - or more specifically, how we come up with the lines we draw to represent those intersections. People have inordinate amounts of trouble with this, and I don't expect you to be able to do this correctly right at lesson 2, but I do want you to give it a shot.

If I were to summarize how these intersections work, it would be this: **Intersection lines sit exactly where they are able to run along the surfaces of both forms simultaneously**.

To understand what this means, lets step back a little and look at this diagram depicting three kinds of intersections.

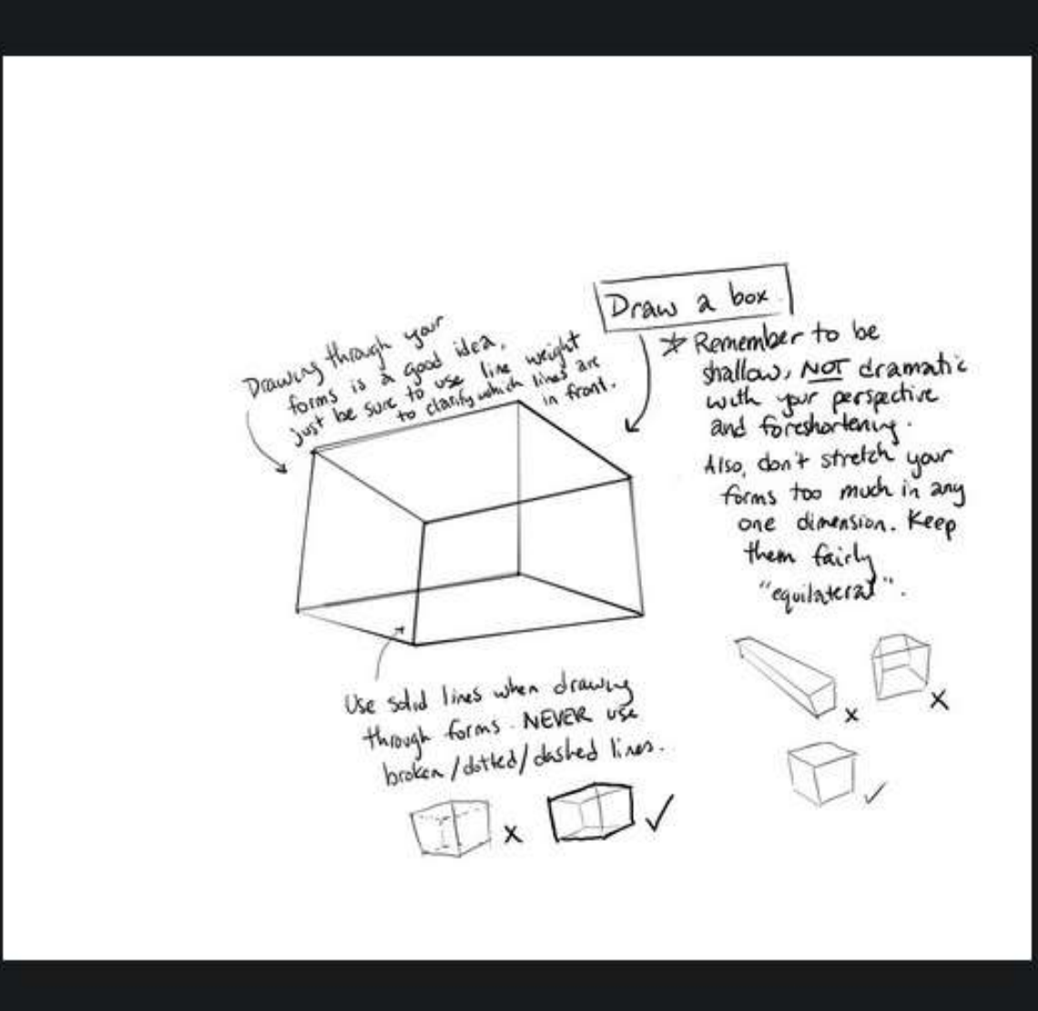
1. **An intersection between two lines** occurs at a point. This is a point in space that happens to sit on both lines simultaneously. The yellow point on the diagram sits only on the blue line, the purple point sits only on the green line, and the pink point sits on neither and is just floating arbitrarily in space. The red point however sits on both lines at the same time, and is therefore the intersection between them.
2. **An intersection between two planes** in 3D space occurs instead in a line - or more accurately, at any points that sit on both planes simultaneously. This also applies to any 2D shapes sitting in 3D space, even if those 2D shapes are bent or warped.
3. Finally, **An intersection between two 3D forms** can be represented by a 2D shape (that can be bent/deformed in space). The edges of this shape run along the surfaces of the two forms simultaneously. You'll never find an edge of this shape that exist only on the surface of one of the forms at a time.

This intersection shape can be quite difficult to figure out, and a big reason for this difficulty is that when we draw two forms in space, **we decide where exactly they are**. The intersections themselves allow us to describe these specific positions to others, but until we actually draw these intersections, how those forms relate to one another is not yet defined.

If you ignored the red intersection line in this diagram, you could argue that the blue box was floating completely in front of the cylinder, or behind it, or you could claim that they were intersecting in a different manner altogether. Once that red shape is drawn however (or more specifically the red line - the fainter red section is the part we wouldn't be able to see without x-ray vision), their relationship is cemented.

This is why form intersections are so critical, and why they become an extremely important tool for you - **because it's your job to explain to your audience how the forms you've drawn relate to one another in the space you've created**.

The actual exercise

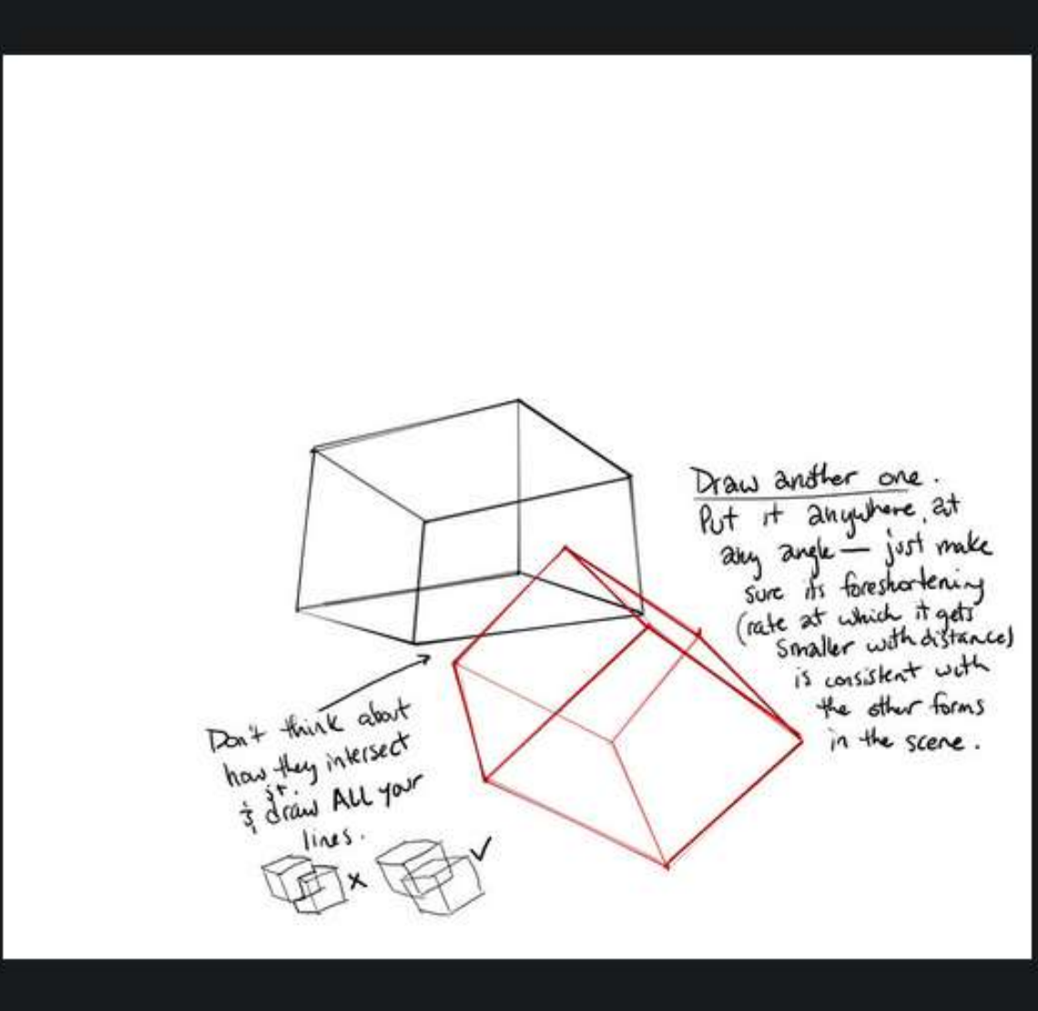

Draw a box
Drawing through your forms is a good idea. Just be sure to use line weight to clarify which lines are in front.
* Remember to be shallow, NOT dramatic with your perspective and foreshortening. Also, don't stretch your forms too much in any one dimension. Keep them fairly "equilateral".
Use solid lines when drawing through forms. NEVER use broken/dotted/dashed lines.
x
✓

You start off with a box. Well, you can choose whichever simple form you like, but in honour of the name of this website, we're going to use a box. It also helps that it's the most versatile form we've got, and it effectively summarizes 3D space by its very nature.

If you're having trouble drawing boxes without explicitly drawing your vanishing points, you should look into the 250 Box Challenge before attempting this exercise.

Be sure to draw through your forms - that is, include the lines that exist on the opposite side of the form, that we technically wouldn't be able to see. This will help you get a clearer understanding of how that form sits in 3D space. I will warn you however that this WILL make your boxes harder to understand visually, so you should absolutely thicken the "visible" lines to make things a little clearer. Adding a little line weight to the silhouette of the form also helps.

Do NOT use underdrawings. In the past, people have attempted to make things easier by roughing in the forms in pencil, or even with the same pen, before going back over them to "clean up" their line work. This is a bad idea, as it encourages you to be wasteful with your rough lines, and then causes you to be overly careful with your clean-up lines, which ruins the flow and confidence of your marks. Instead, every mark you put down should be done so using the ghosting method - everything should be planned and thought through, and ultimately executed with confidence. You can later go over your lines to add more line weight, but there's a difference there - you're not replacing the lines, you're adding thickness to them.

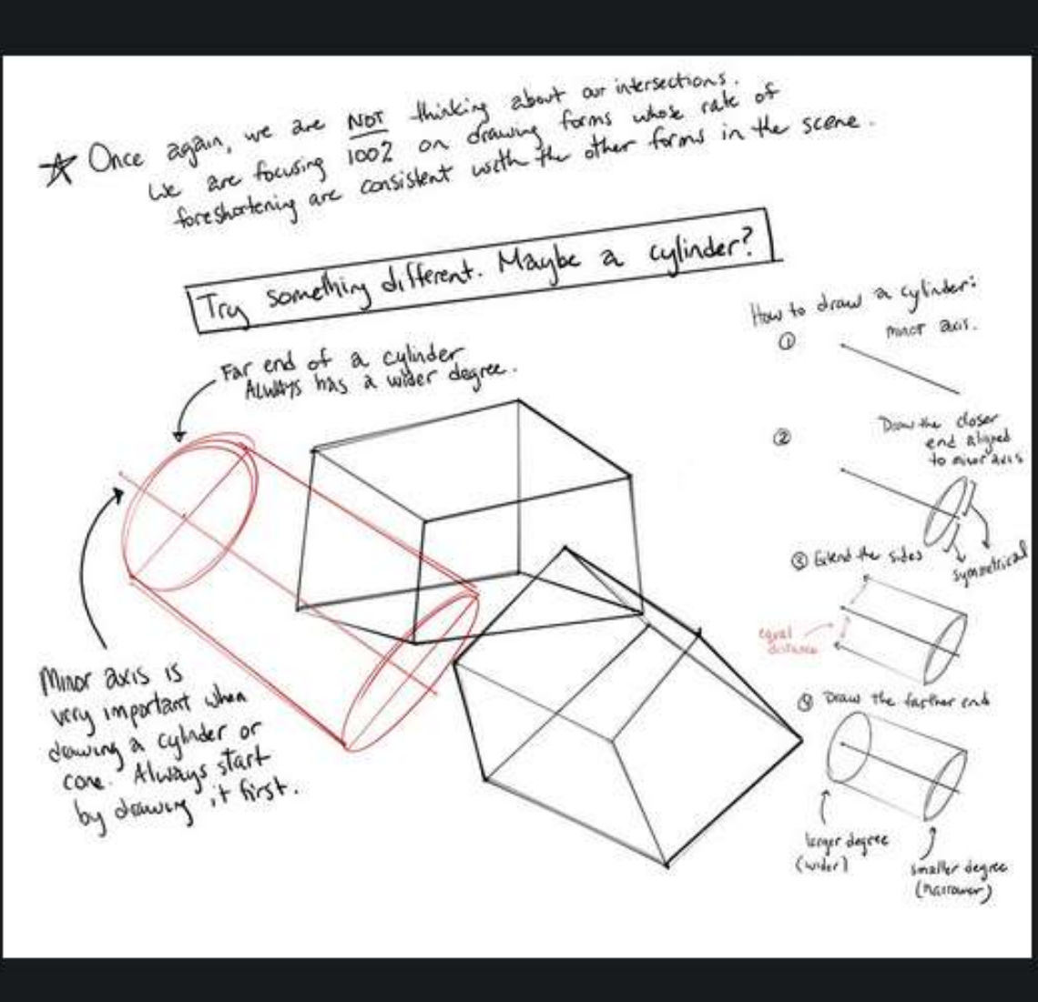

Draw another one. Put it anywhere, at any angle — just make sure its foreshortening (rate at which it gets smaller with distance) is consistent with the other forms in the scene.
Don't think about how they intersect & just draw ALL your lines.
x
✓

Now, draw another. This is where the meat of the exercise comes in. Your primary goal here is to draw a bunch of forms that all look and feel consistent. That is to say, they all feel like they belong together in the same space and scene.

When two forms don't feel consistent, it's because their rate of foreshortening - how quickly a form shrinks or grows as it moves further away or closer to the viewer - are not the same. One box may get smaller REALLY quickly (dramatic perspective or foreshortening) and another may barely change over the length of its form (shallow perspective or foreshortening).

So, the goal of this exercise is to learn how to make your forms look and feel as though they should exist together in the same scene.

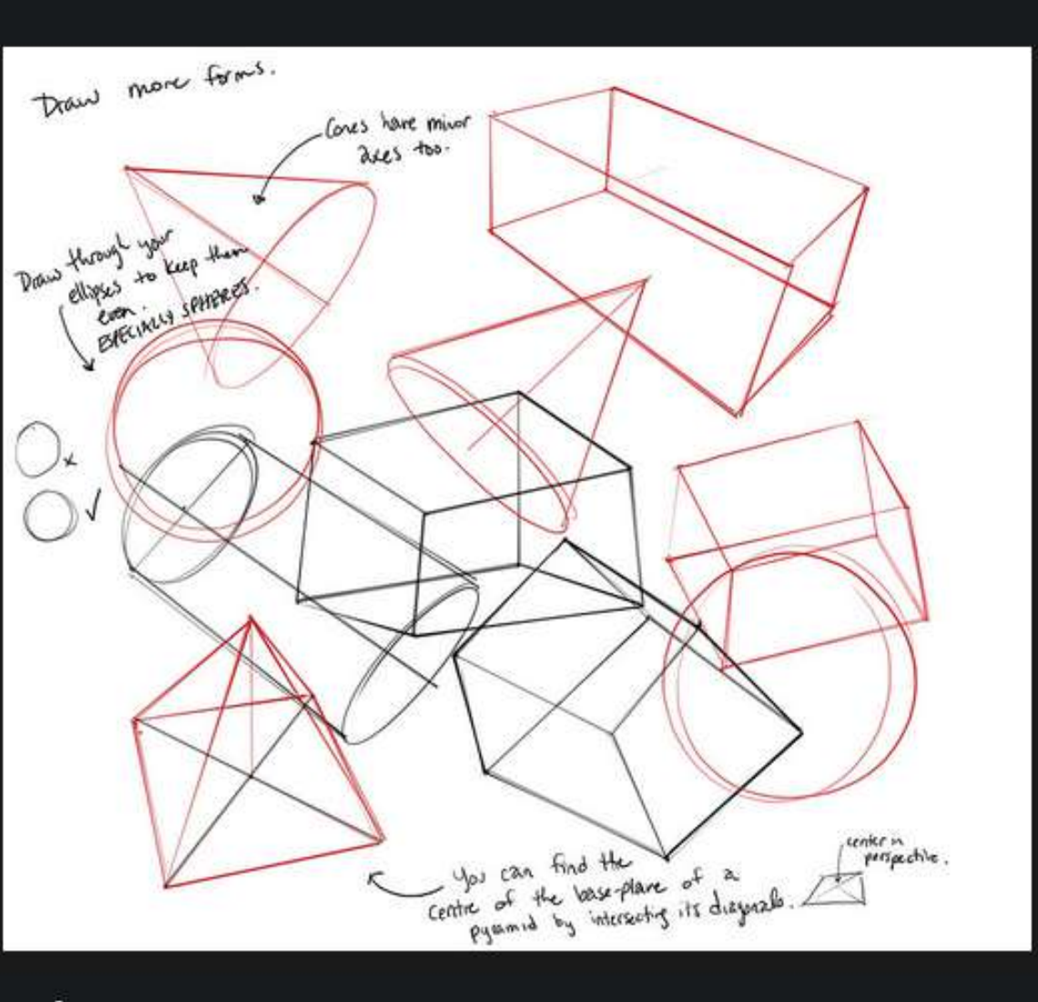
For now, I **strongly encourage you** to avoid forms that are stretched in any one dimension. For example, long tubes, long boxes, and so on. At this point it is far better to stick to fairly "equilateral" forms. That is, forms that are roughly the same size in every dimension. This was of course mentioned at the top of this page, and will be mentioned again.


* Once again, we are NOT thinking about our intersections. We are focusing 100% on drawing forms whose rate of foreshortening are consistent with the other forms in the scene.
Try something different. Maybe a cylinder?
Far end of a cylinder always has a wider degree.
Minor axis is very important when drawing a cylinder or cone. Always start by drawing it first.
How to draw a cylinder:
① minor axis.
② Draw the closer end aligned to minor axis
symmetrical
③ Extend the sides
equal distance
④ Draw the farther end
larger degree (wider)
smaller degree (narrower)

Now we can explore other forms. If you're still feeling shaky with your boxes (which is perfectly acceptable), you can do entire sheets of only boxes. In fact, that's actually a pretty good idea, since as I said before, a box is the most versatile form. If you can draw boxes consistently, then you can construct any other form within the space enclosed by that box.

When dealing with any ellipse-based forms, **always start with the minor axis**. If you don't remember what a minor axis is, jump back to the ellipse section of lesson 1 for a quick refresher.

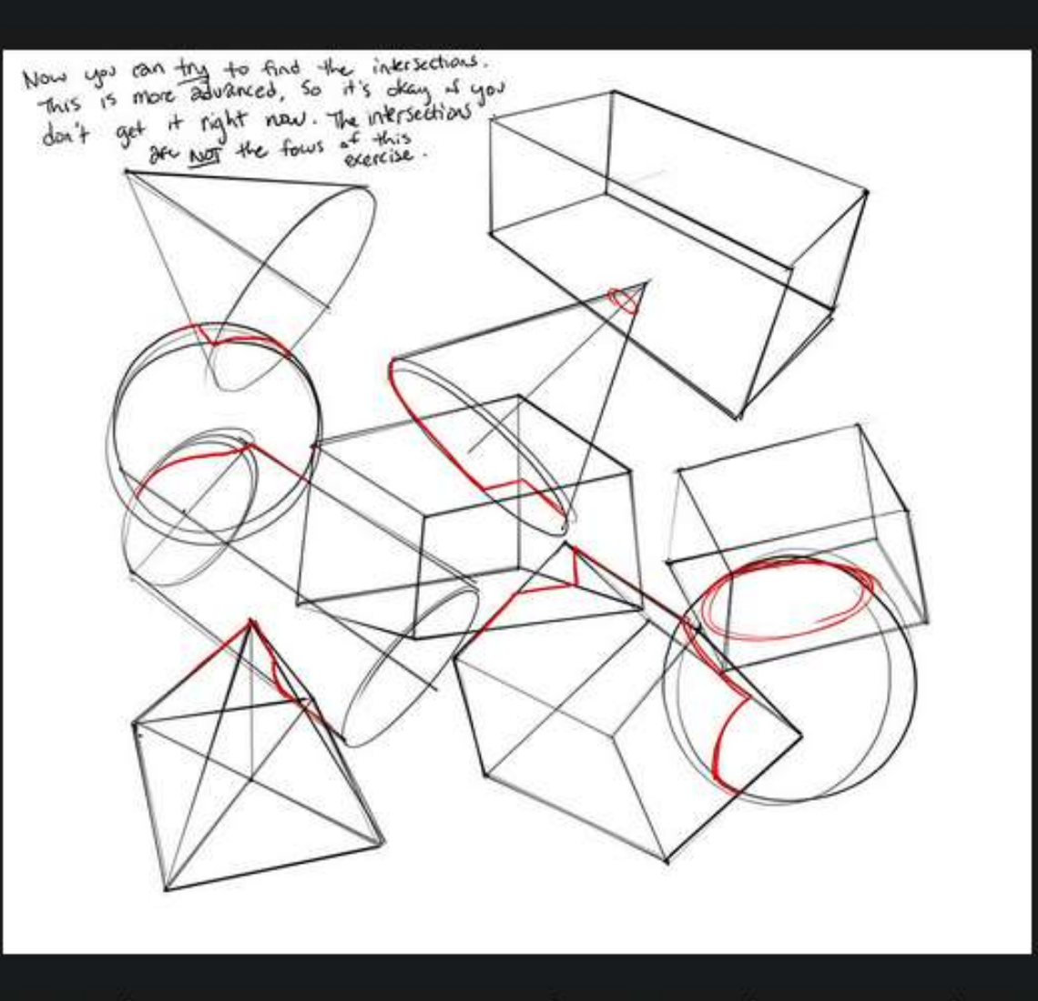
This image includes a really quick breakdown on how to draw a cylinder, along with points to keep in mind (always keep your minor axis centred in the cylinder, and keep the degree of your far end ellipse larger (wider) than the end that is closer to the viewer). If you feel you need more practice (and I assure you, you probably do) with cylinders and ellipses, don't worry - you'll get plenty more from the 250 Cylinder Challenge later on (after Lesson 5, ideally). You can look at those notes to get a sense of how to construct your cylinders around a minor axis as well.


Draw more forms.
Cones have minor axes too.
Draw through your ellipses to keep them even. ESPECIALLY SPHERES.
x
✓
You can find the centre of the base-plane of a pyramid by intersecting its diagonals.
center in perspective.

Now, fill up the whole page with forms. **I mean it, fill up the whole damn page**. People tend to submit homework that has tiny groupings of two or three intersecting forms. I want to see an ENTIRE page of forms all layered on top of each other. It will get visually confusing, but push through it, and use line weight to emphasize certain lines over others. Remember that you have a repertoire of 5 simple forms - boxes, tubes, balls, pyramids and cones.

Also, don't forget to draw through your ellipses, and to apply the ghosting method. The ellipse thing goes double for spheres, because if your circle is at all uneven, it will **not read as a sphere**.

Lastly, avoid drawing forms that are half off the page, because they don't end up teaching us a whole lot. So, I expect to see a heavy concentration of forms around the center.


Now you can try to find the intersections. This is more advanced, so it's okay if you don't get it right now. The intersections are NOT the focus of this exercise.

Now that you have filled in your page with forms, you can now try giving some thought to how those forms intersect. In the lesson section above, I discuss how we approach intersections between forms - specifically using rounded forms, because they're tricky. Be sure to check that out.

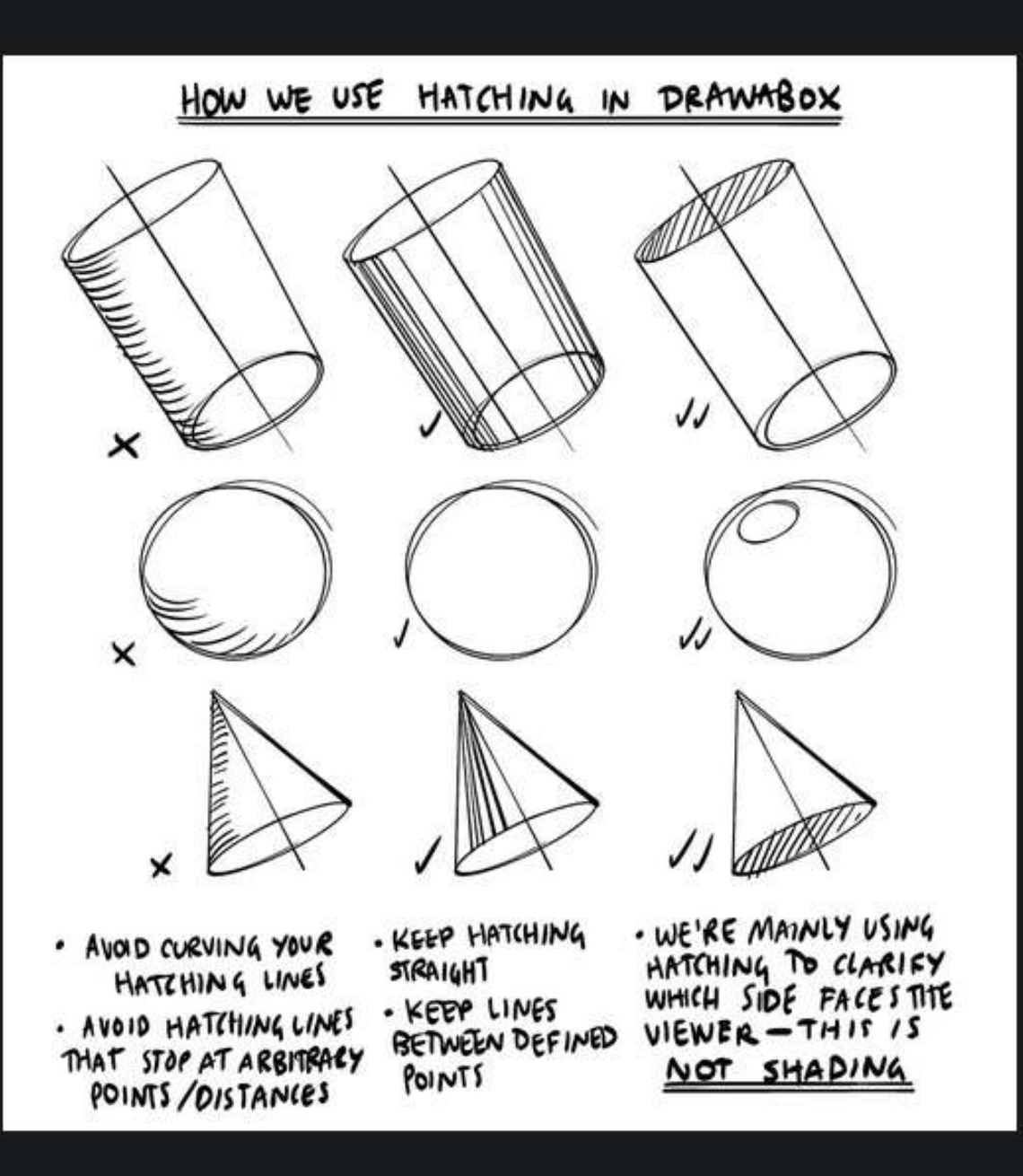
Just remember - I do not expect you to nail this. Form intersections are not simple by any stretch, and they take time and work to truly understand. Give it a shot, and even if it doesn't turn out well, keep moving forwards. I fully expect you to continue practicing this even after I've marked the lesson as complete, so you will have the opportunity to continue working at it as you move forwards.

Luckily, this stuff doesn't come into play until lesson 6 and 7, and in those lessons the intersections we use are considerably simpler than these.

The purpose of this exercise

This exercise is all about developing your understanding of 3D space and how forms exist within it in relation to each other. It's one thing to be able to draw a form that feels three dimensional on its own, but throwing that form in with a bunch of others within the same space leaves a lot of room for inconsistencies and contradictions to arise. Building up your own grasp and overall belief in the illusion you're producing (something that is pushed that much further by learning how to define the actual positions of forms relative to one another through their intersection lines) helps us push a lot of this work more to our subconscious, where all of the lies we're juggling can be kept in line.

Hatching


HOW WE USE HATCHING IN DRAWABOX
x
✓
✓✓
• AVOID CURVING YOUR HATCHING LINES
• AVOID HATCHING LINES THAT STOP AT ARBITRARY POINTS/DISTANCES
• KEEP HATCHING STRAIGHT
• KEEP LINES BETWEEN DEFINED POINTS
• WE'RE MAINLY USING HATCHING TO CLARIFY WHICH SIDE FACES THE VIEWER — THIS IS NOT SHADING

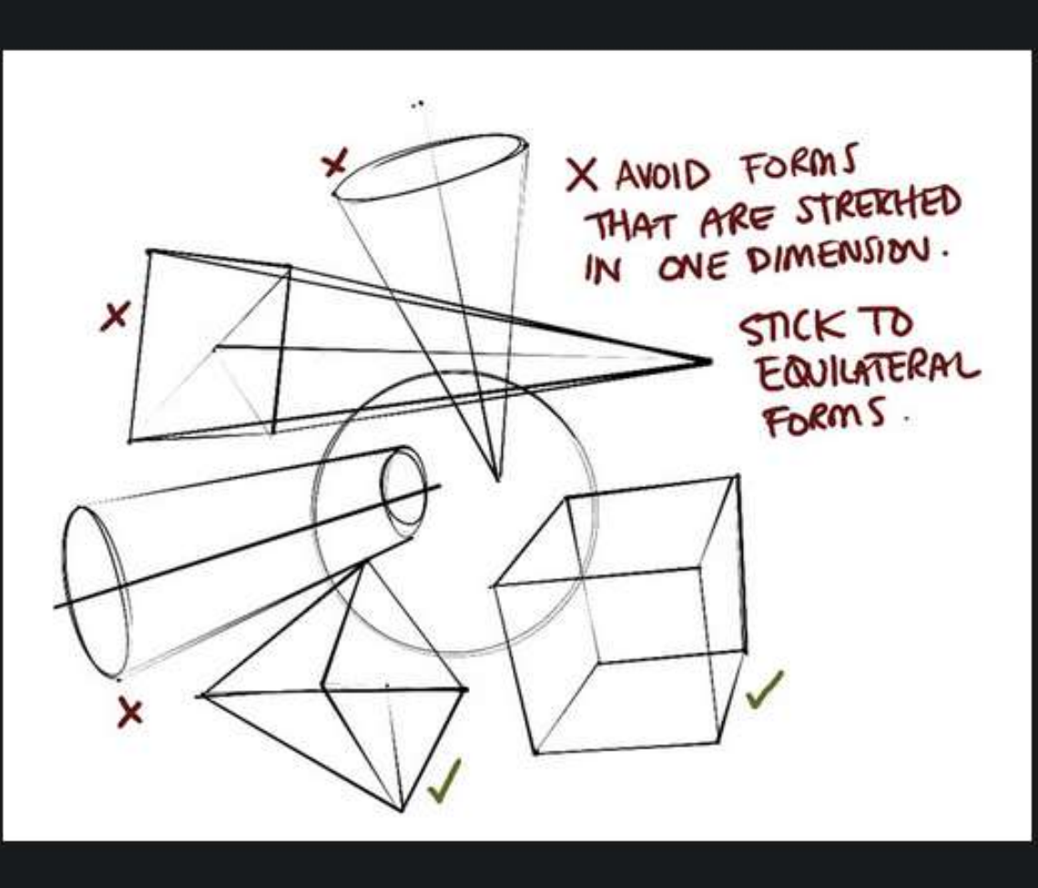
Students sometimes get a little overzealous with their hatching, so here's a quick guide on how to approach it within this course. Outside of Drawabox, hatching is a wonderful skill that can be used for capturing the formshading on an object. In Drawabox, however, we **do not use hatching as shading** and instead have it serve a very specific purpose - to help demonstrate which side of a form is facing the viewer.

The area students struggle with most is how to approach rounded surfaces. Because hatching lines function as contour lines (as do any marks along the surface of an object), to have them run along those surfaces, they have to curve *just* so, which is painfully difficult when you've got a lot of very short marks.

Here, because it's not really relevant to the core concepts I want students to learn, our solution is to simply not bother with curving hatching lines. Instead, we either draw hatching lines that run along the flat portion of a form (lengthwise on a cylinder, for example, instead of wrapping around it).

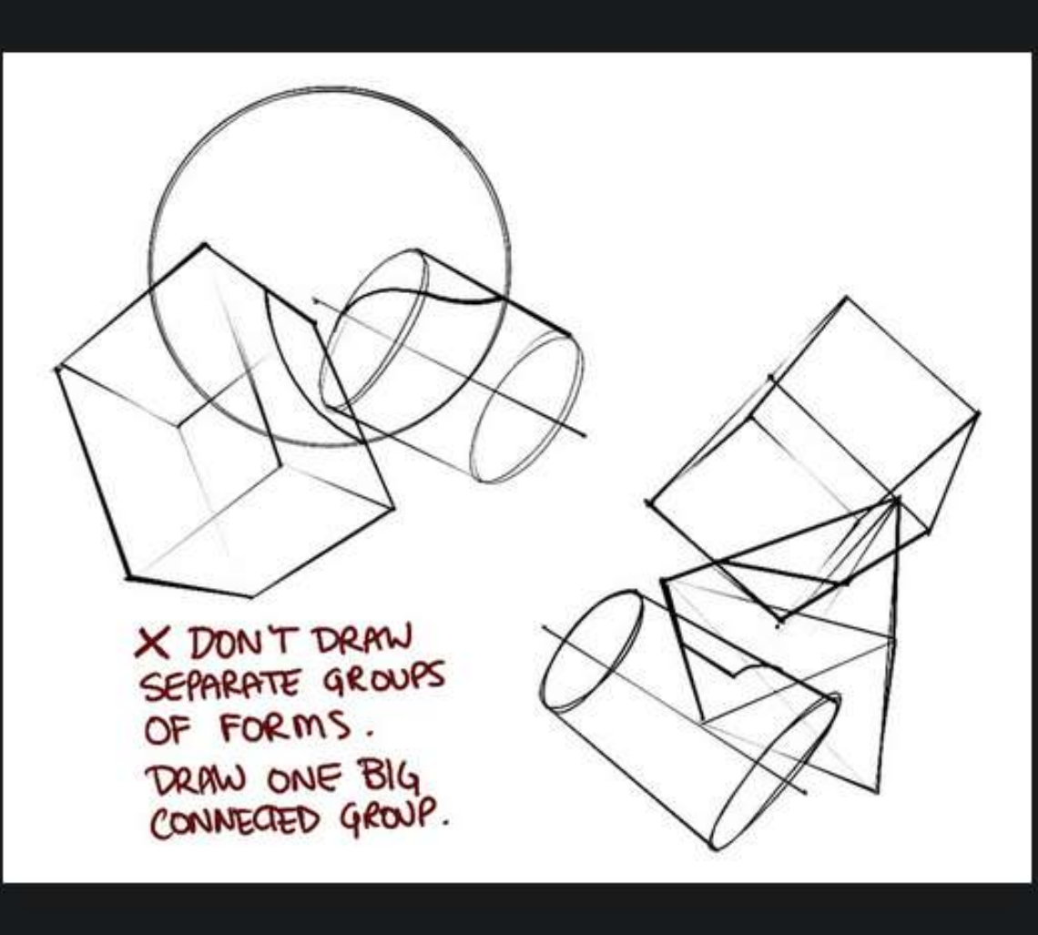
In the case of a sphere, where there are no "straight" surfaces, I instead either leave it blank, or I'll add a little contour ellipse on one of the "poles" of the sphere (basically just an arbitrary area you can choose for yourself). This is very similar to how we use contour ellipses in the organic forms with contour curves exercise to denote when the tip of a sausage form is pointing towards the viewer. A sphere is, after all, just the shortest sausage form you can have.

Mistake: Using stretched forms


X AVOID FORMS THAT ARE STRETCHED IN ONE DIMENSION.
STICK TO EQUILATERAL FORMS.
x
✓

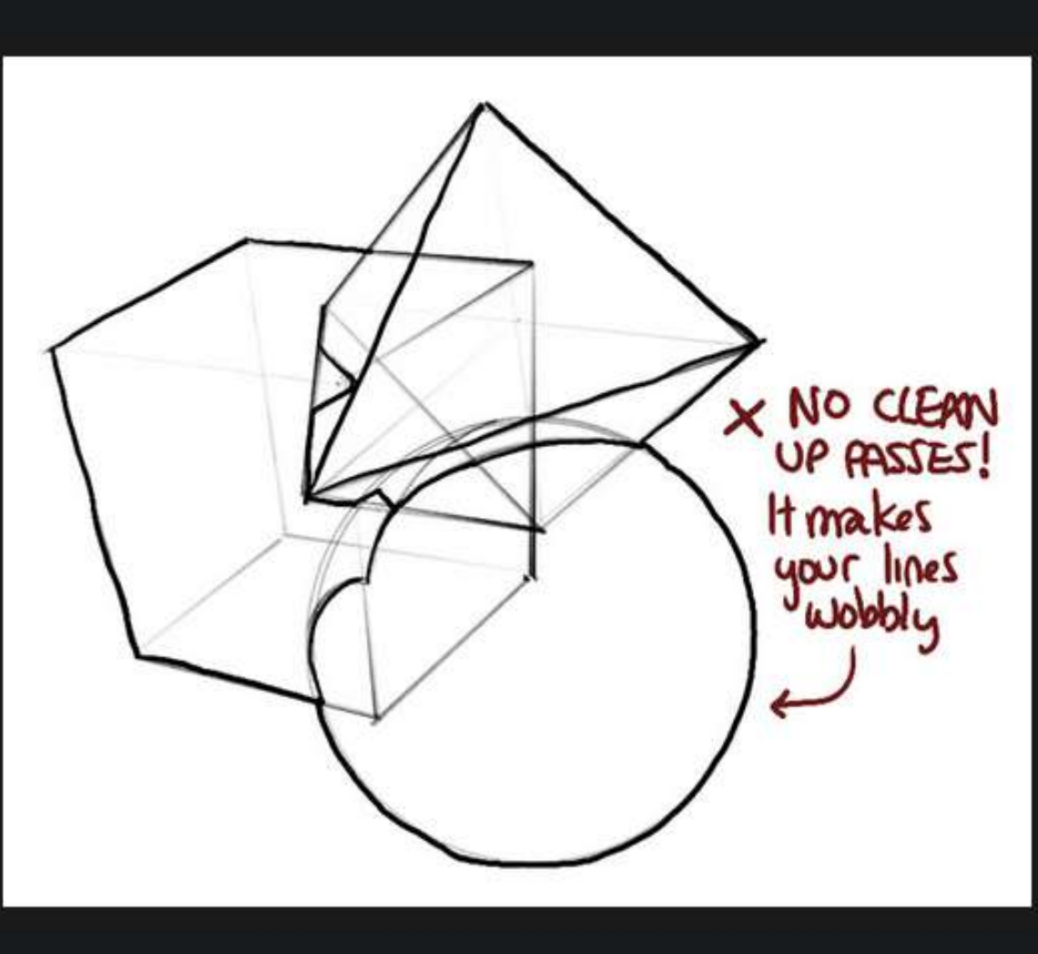
I promised I'd mention this again - don't draw stretched forms! It increases the complexity of the foreshortening in the scene and is going to distract you from the main focus of the exercise.

Mistake: Small groups of forms


X DON'T DRAW SEPARATE GROUPS OF FORMS.
DRAW ONE BIG CONNECTED GROUP.

I don't want you drawing individual groupings on a single page. Students will often do this when they're not feeling quite as confident about what they're doing. No matter how you feel about it, I want you to draw one big network of forms that are all overlapping and interconnecting.

Mistake: Using a clean-up pass



Mentioned this one in the instructions as well, and it had its own little section! Some of you with prior experience drawing may be familiar with the idea of roughing things in, or drawing them lightly/faintly before going back over the lines with a nice, rich, dark line.

Don't do that. I want you to draw each and every line you put down with the same kind of confidence as you would afford any part of this drawing. Don't worry about hiding things or organizing your strokes.

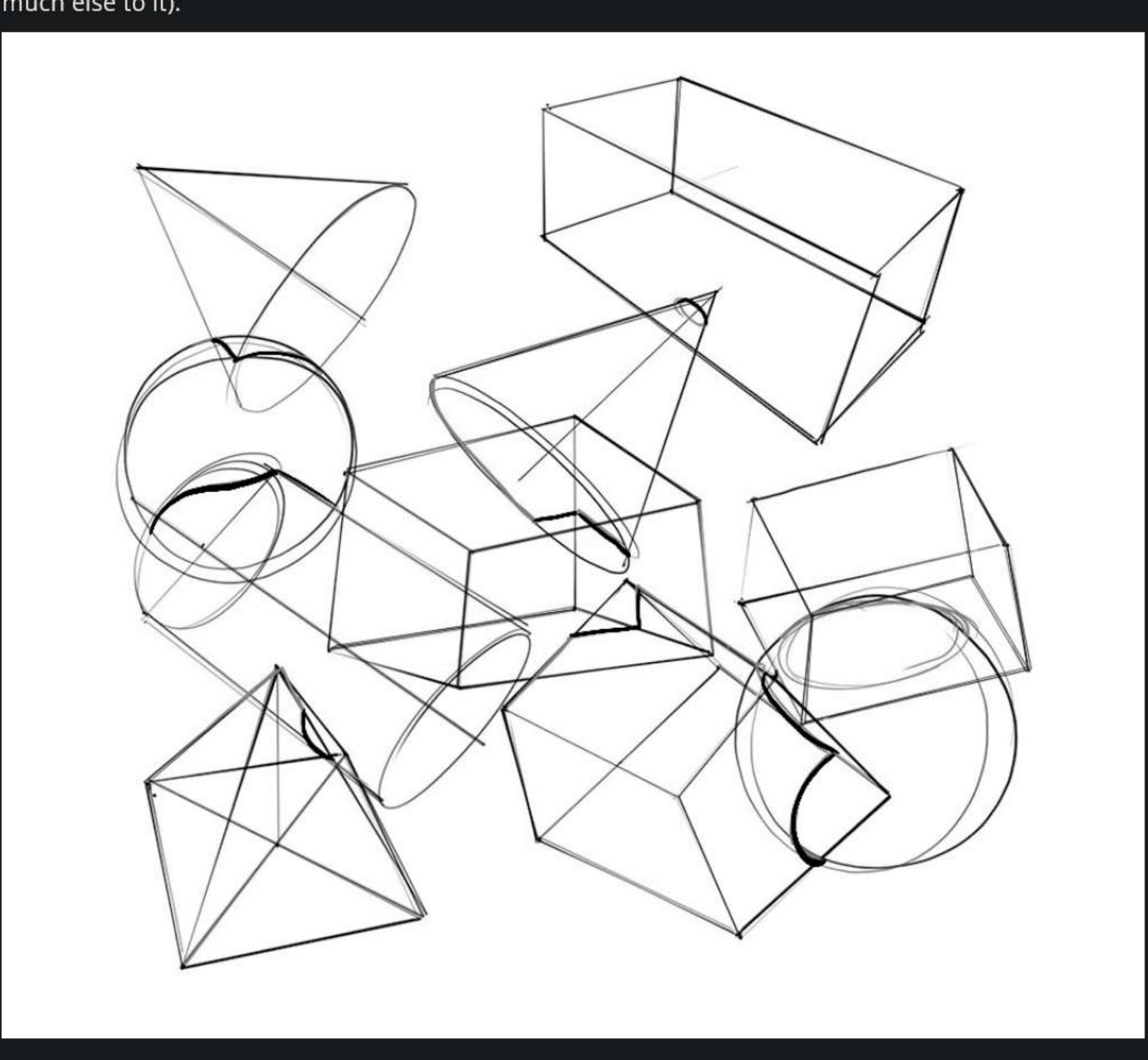
Once you're done all of your forms, you can add line weight to help develop a hierarchy to your drawing, but line weight should only be added to local sections of existing lines to emphasize them and clarify overlaps. Don't go applying line weight to the entirety of a line, ESPECIALLY not to your ellipses. This way the bits of weight you do add here and there can all be drawn confidently, using the ghosting method in order to keep them smooth and confident.

Students going back over their work with a slow, belabored stroke trying to be careful generally causes their drawings to become stiff and undermines the solidity of their forms.

This applies to the Drawabox course in general, and to all of its lessons.

Example homework

And here's what it looks like when it's done (it's basically the last shot of the demo, since there's not much else to it).



<<< Construction

This page has student-made recordings

They're great to draw along with, or just to see how much time these exercises really take when they're not rushed.

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

How to Draw by Scott Robertson

When it comes to technical drawing, there's no one better than Scott Robertson. I regularly use this book as a reference when eyeballing my perspective just won't cut it anymore. Need to figure out exactly how to rotate an object in 3D space? How to project a shape in perspective? Look no further.

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- The great conspiracy
- Telling a convincing lie
- Exploring a 3D space
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- Understanding texture
- Observation and memory
- Visual library
- Don't worry about shading here
- Cast shadows
- Implicit vs explicit
- Detail density
- Silhouette
- Don't copy your reference - understand it
- Homework and exercises

Construction
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- The process
- Observation vs construction
- A technique for learning
- Homework and exercises

Lesson 2: Contour Lines, Texture and Construction

Organic Intersections

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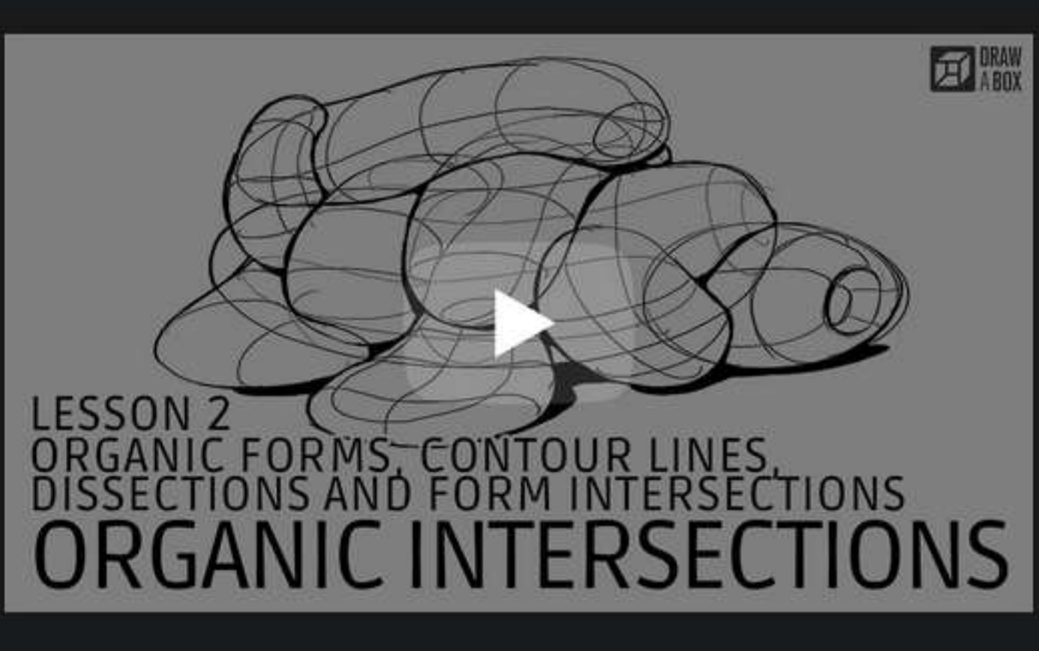
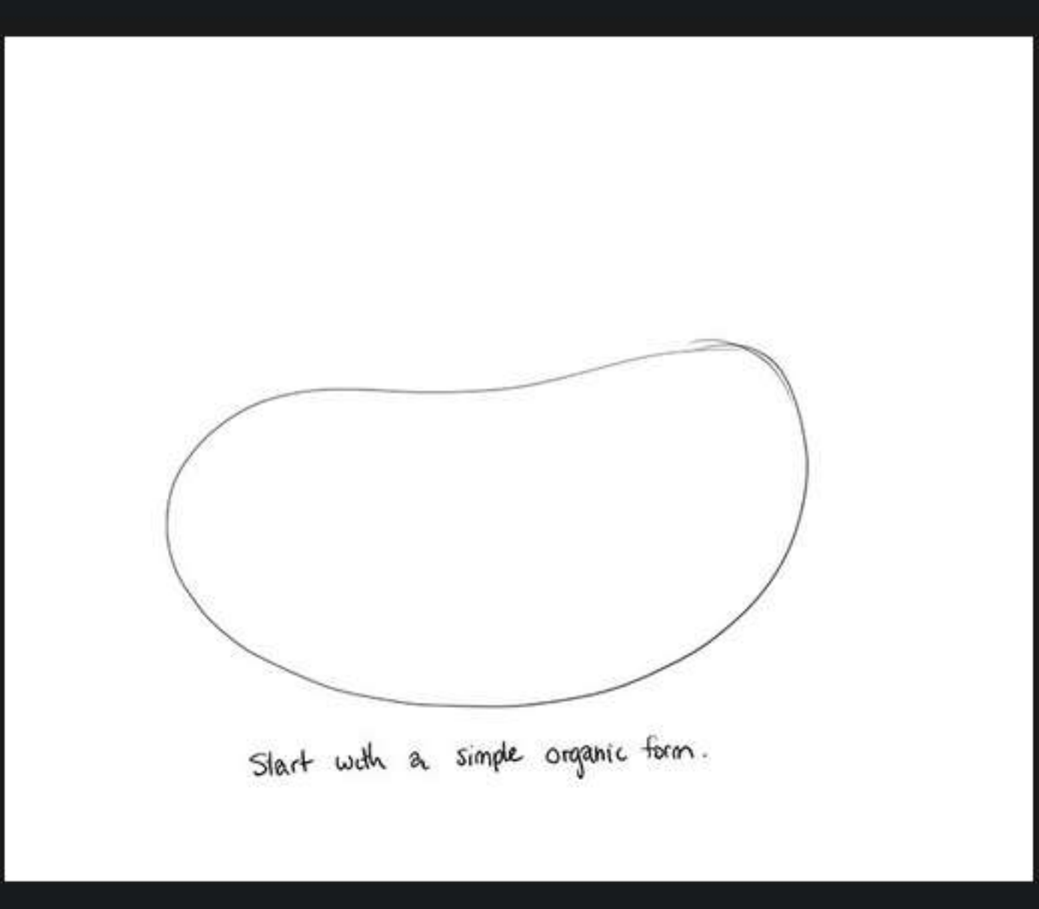
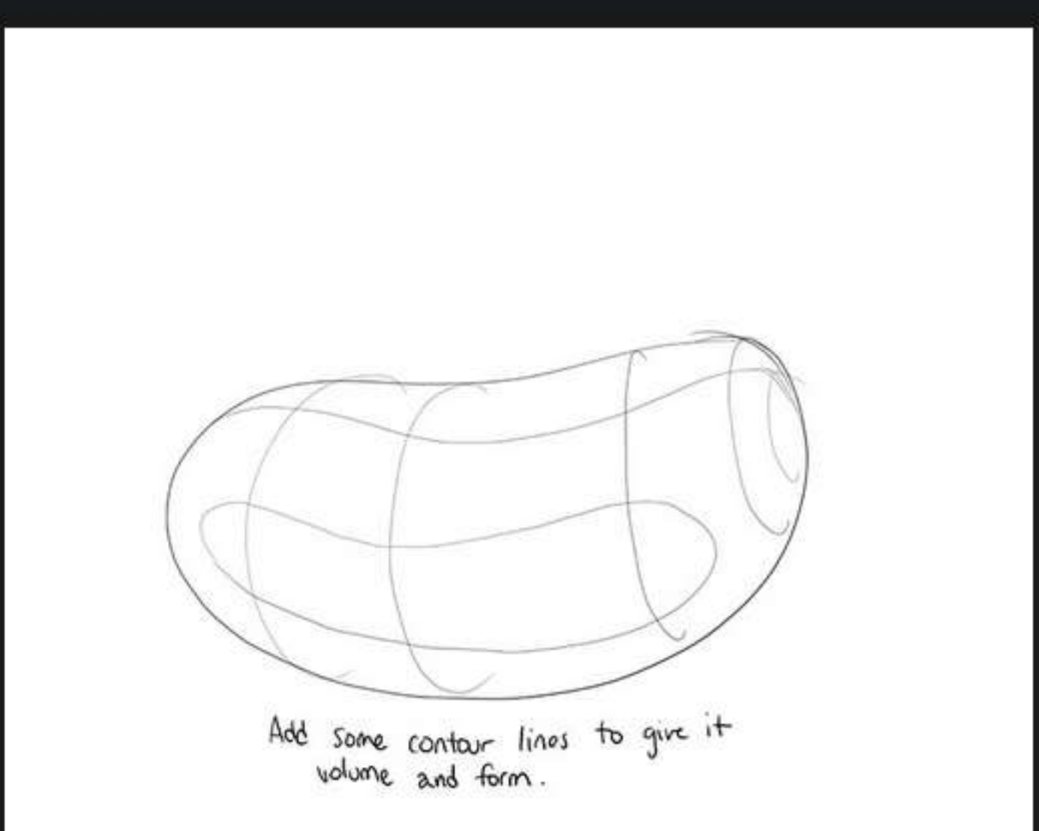

LESSON 2
ORGANIC FORMS, CONTOUR LINES, DISSECTIONS AND FORM INTERSECTIONS
ORGANIC INTERSECTIONS

This exercise is less about getting organic forms to actually cut into one another, and more about how they can be piled on top of one another in a way that feels convincing. It requires a grasp of the weight of these sausage forms, and how they might slump and sag where that weight is not supported.

Keep your forms simple, and try to picture them as being a bunch of water balloons that you're trying to set in a pile.


Start with a simple organic form.

To start with, draw a simple organic form. Since we're going to be dealing with a lot of them, the complexity of each individual form is not particularly important. It's generally best to stick to something simple, like a sausage form.

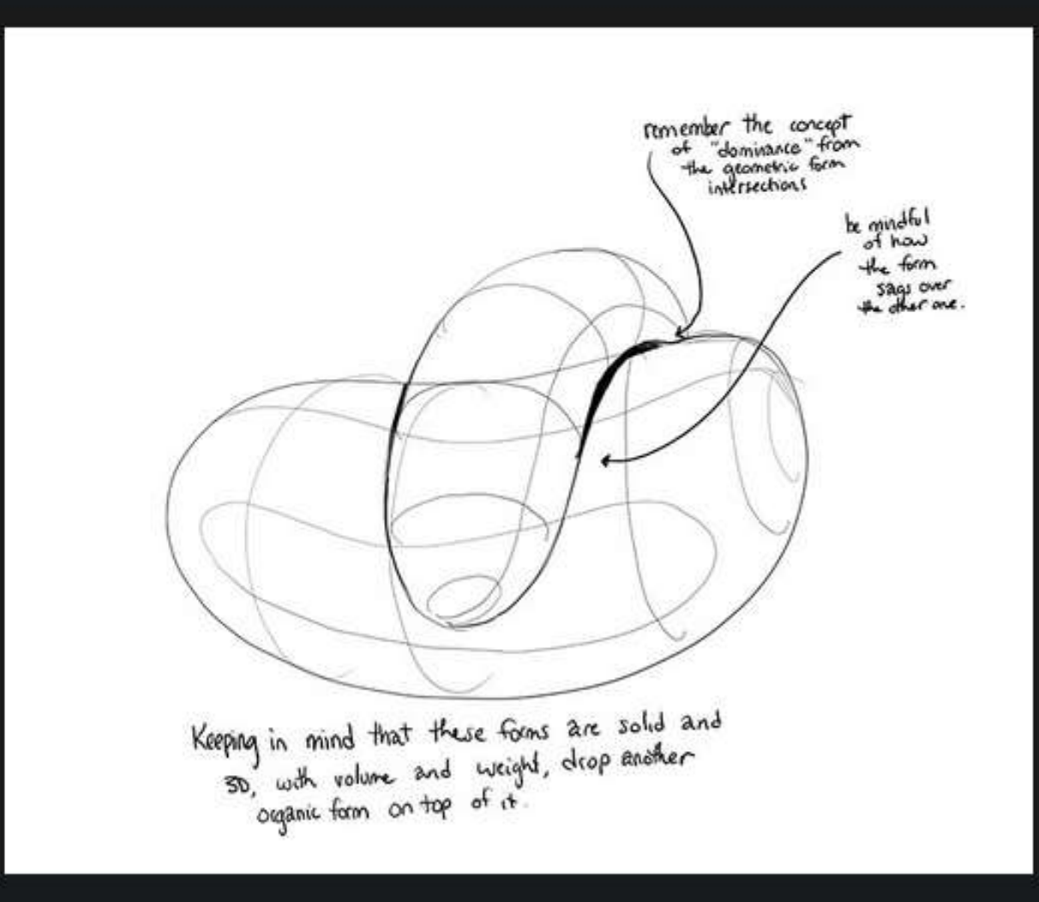

Add some contour lines to give it volume and form.

Next, just like in our organic forms with contour curves, and even in our dissections, we add contour lines to give the flat shape a sense of volume and form.

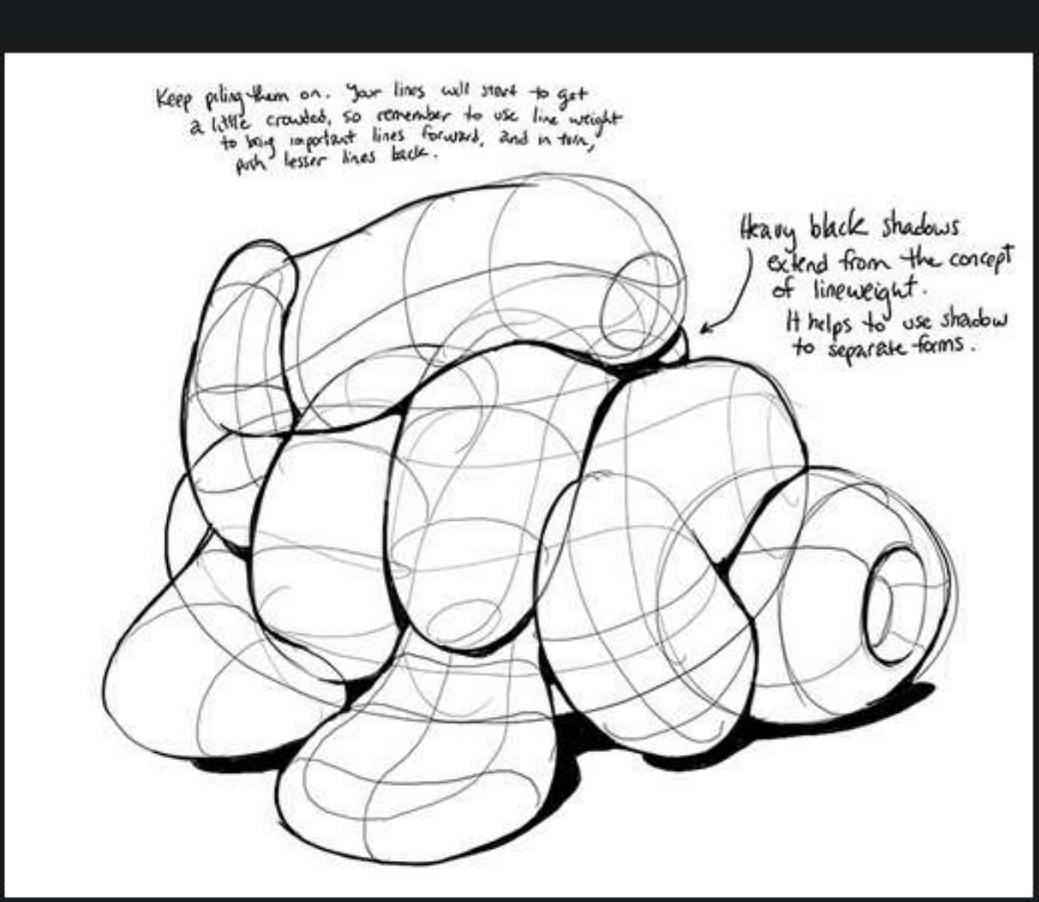
Note: You may notice that these contour lines are a little different from what we used in the previous contour line exercise - but in fact, they're essentially the same. Contour lines run along the surface of a given form, and in doing so, they describe how that form turns in space. In the previous exercise, we focused on contour lines that run perpendicular to the flow of our sausage form, but we can run them in whatever direction we like - though some are more effective than others.

As you complete this step, think about what it is you're doing - you're not just drawing lines on a page. You're imbuing a flat shape with volume, with weight, with solid form. It's no longer just a 2D shape, but a 3D object that can be lifted, moved, thrown and dropped. If you pick it up from one end, it will dangle. If you hold it from its middle, it will sag on both sides.

Don't move ahead until you can feel it in your mind, that this form has real weight to it.


remember the concept of "dominance" from the geometric form intersections
be mindful of how the form sags over the other one.
Keeping in mind that these forms are solid and 3D, with volume and weight, drop another organic form on top of it.

Now we're going to test this idea. Imagine that you had another dangly sausage form, and that you dropped it on top of the first. Consider how it would fall, how it would be held up in one place, and sag in others. Consider how it would conform to the mass beneath it.


Keep piling them on. Your lines will start to get a little crowded, so remember to use line weight to bring important lines forward, and in turn, push lesser lines back.
Heavy black shadows extend from the concept of lineweight. It helps to use shadow to separate forms.

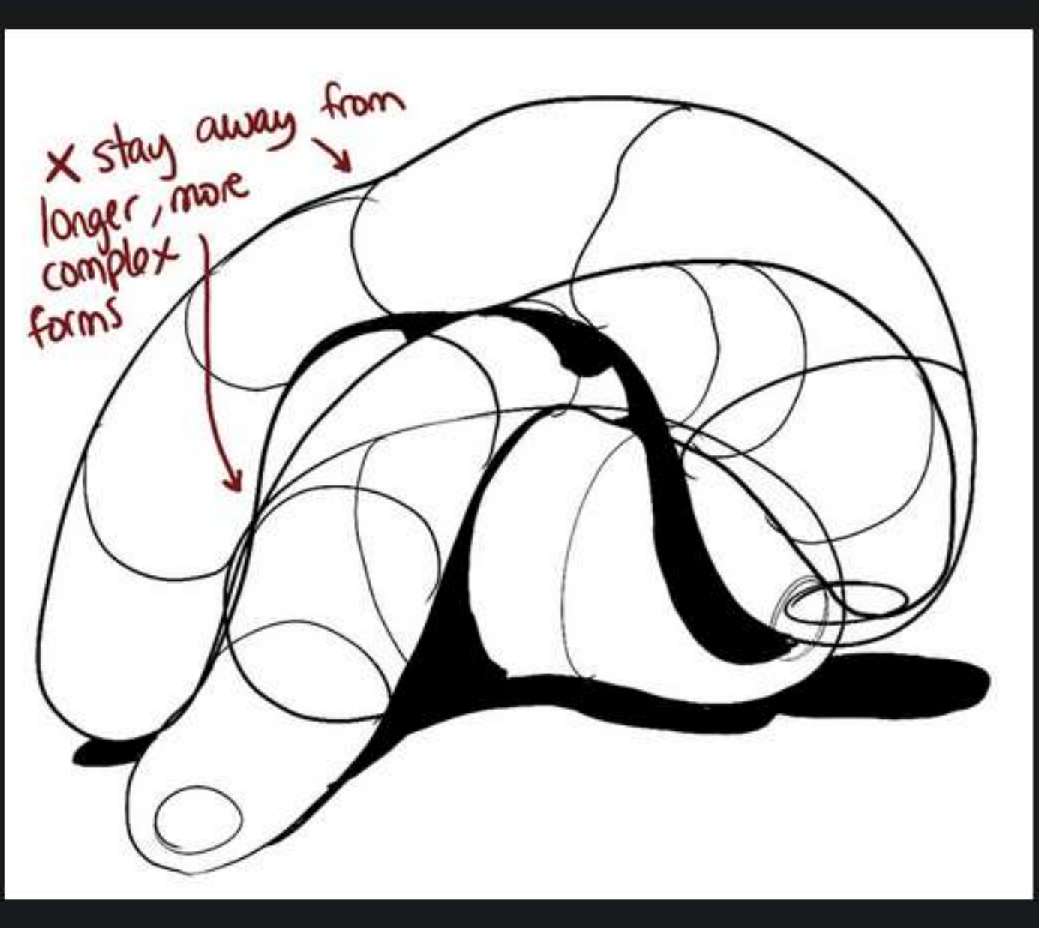
All there is to do afterwards is repeat the process. You can drop more organic forms on top, or you can play with wrapping them around each other, or jamming them into one another. It's completely up to you.

The important thing is what I've stressed thus far - you're not pasting flat shapes on top of each other, you're dealing with solid forms that cannot occupy the same space. So, in order to wedge them against one another, one has to displace the other.

Much of what we tackled in the form intersections is at play here as well - the only difference is that our forms are more malleable and flexible. When two of these forms intersect, they displace each other as I mentioned, but you still experience a dominance of one form over another, and that dominance is still handed off between them at different points in space.

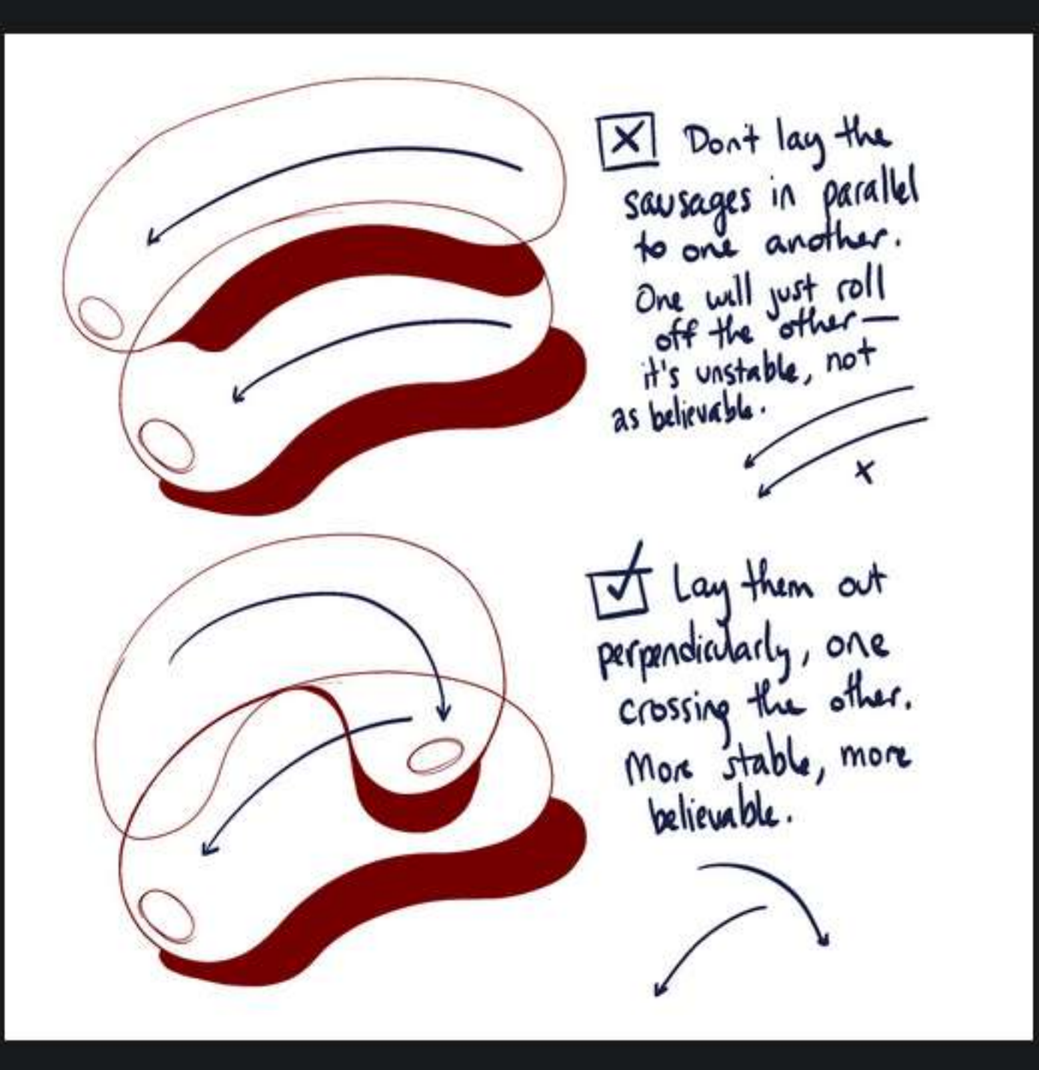
The purpose of this exercise

This kind of exercise can be quite calming, once you get the rhythm and the sense of form and mass. Once that clicks, it's just a matter of dropping form after form after form. In the long run, you will also find this exercise to come up when you start dealing with topics such as drawing insects, or drawing animals, where we often need to add additional masses in a way that doesn't just feel like we're pasting stickers on top of our construction. Every form we add needs to somehow relate solidly and consistently to that which is already there in order for the whole thing to maintain its believability and sense of solidity.


X stay away from longer, more complex forms

Mistake: Complicated forms

Try to stick to really simple sausage forms, as shown in the instructions here. Stay away from forms that have swelling or tapering through their lengths, or forms that are too long and snakelike. Simple sausages with consistent widths through their lengths is what you want.


☒ Don't lay the sausages in parallel to one another. One will just roll off the other — it's unstable, not as believable.
☑ Lay them out perpendicularly, one crossing the other. More stable, more believable.

Mistake: Laying sausages in parallel

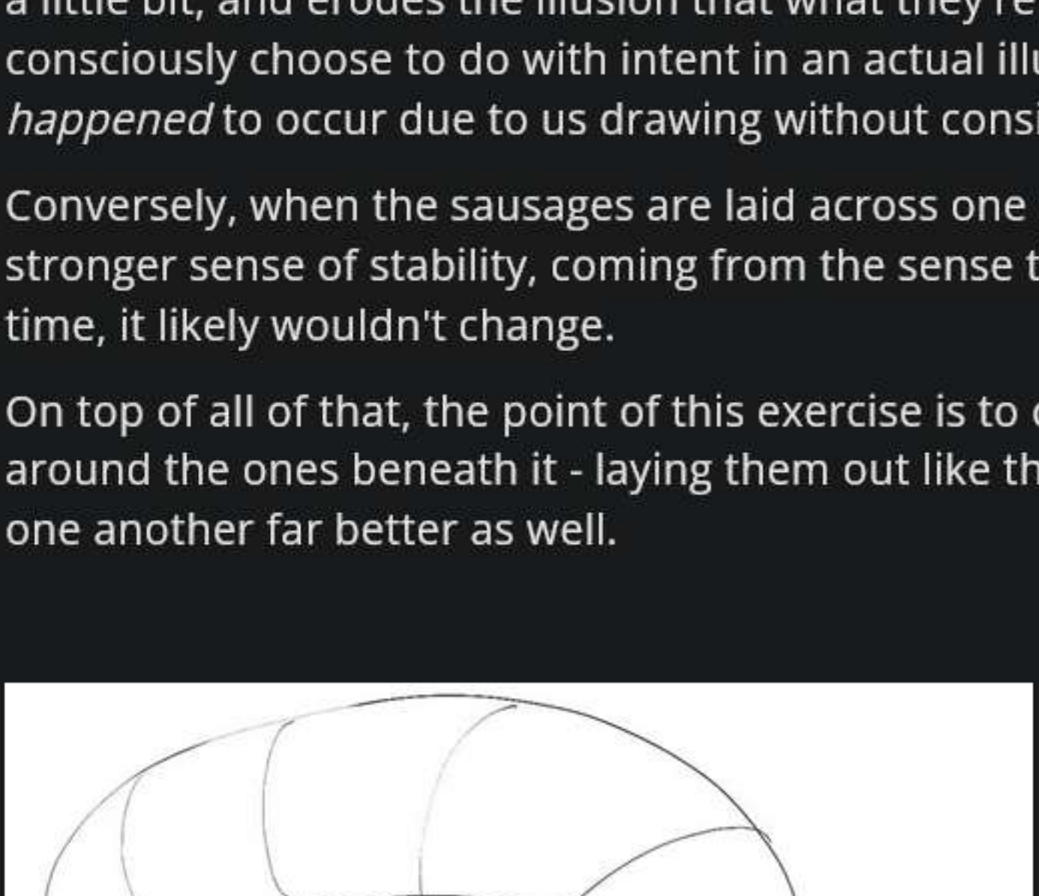
When doing this exercise, it helps a great deal to lay the sausages out cross-wise - that is, in opposite orientations, so they lay perpendicular to one another, instead of parallel.

Part of what contributes to the believability of an arrangement of forms is the sense of stability that is presented. If the sausages run parallel to one another, we can assume that in the next instant, the top one will roll away, giving the impression that we've been caught in a frozen moment of time.

While putting the viewer in a "frozen" state isn't inherently wrong or bad, it does serve to undermine the viewer's suspension of disbelief a little bit, and erodes the illusion that what they're looking at is 3D - so it's something we would consciously choose to do with intent in an actual illustration, rather than something that just *happened* to occur due to us drawing without consideration.

Conversely, when the sausages are laid across one another, perpendicularly, we're given a much stronger sense of stability, coming from the sense that if we were to stare at this pile for a period of time, it likely wouldn't change.

On top of all of that, the point of this exercise is to consider the way in which each form wraps around the ones beneath it - laying them out like this allows us to focus on how they wrap around one another far better as well.

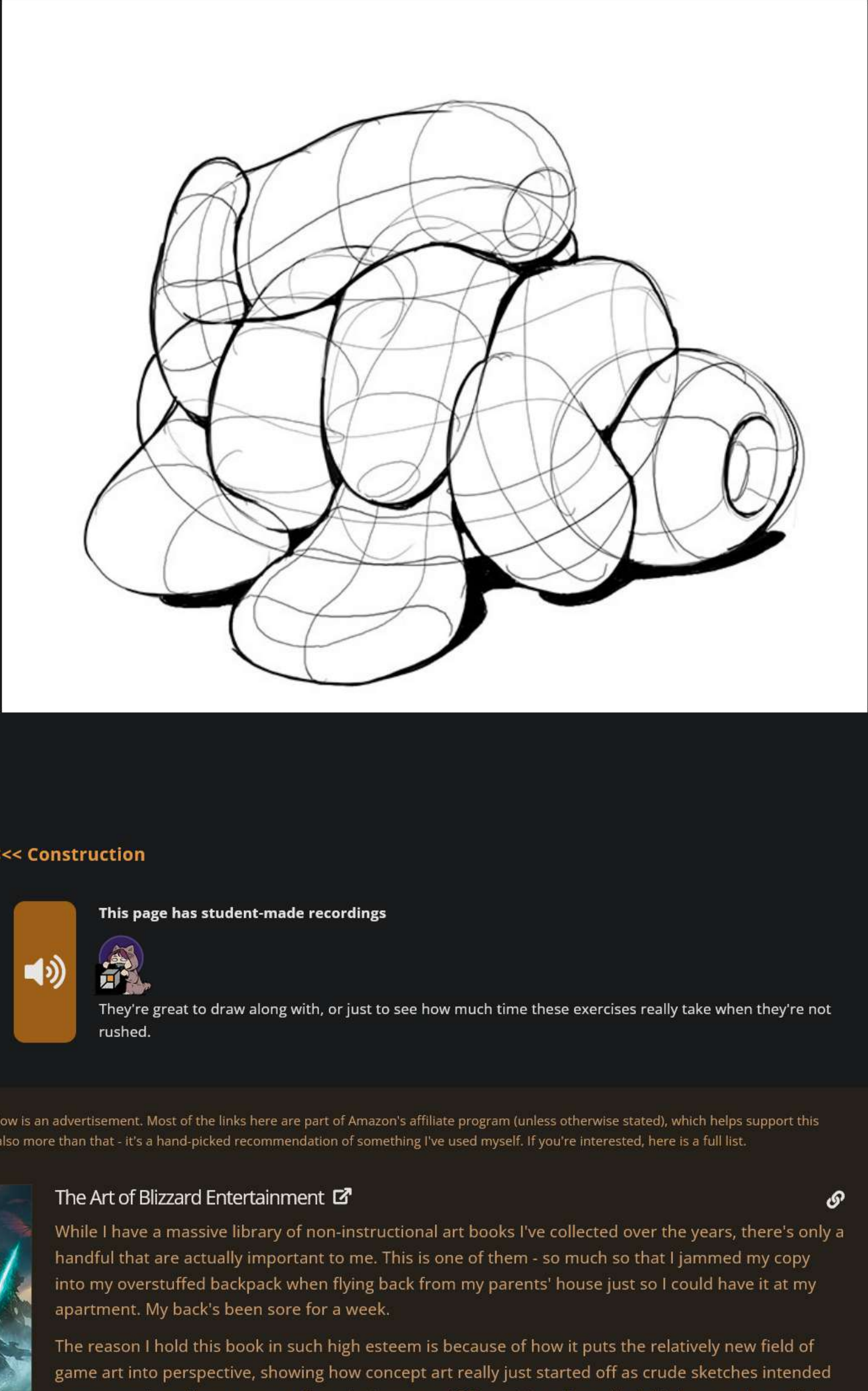

this shadow is unnaturally attached to the form casting it.
more correct, projects onto underlying form.

Mistake: Shadows sticking to forms

When dealing with the shadows cast by our forms, we need to remember that these shadows are being cast and projected onto the surfaces that exist beneath the form - whether that surface is directly underneath or miles away, whether it's flat and simple or curving in some awkward manner. The shadow itself warps itself to the surface it falls upon. A frequent mistake is to have the shadow adhere too closely to the form casting it, resulting in some illusion-breaking shadow play.

Example homework

Since one page should contain only one 'pile' of forms, this is the same as the last step shown above.



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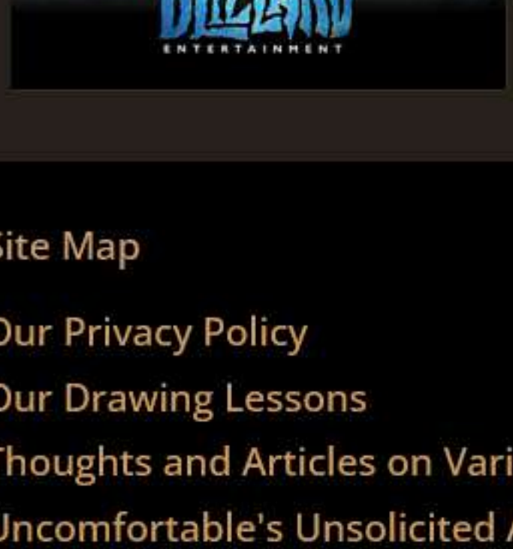

The Art of Blizzard Entertainment

While I have a massive library of non-instructional art books I've collected over the years, there's only a handful that are actually important to me. This is one of them - so much so that I jammed my copy into my overstuffed backpack when flying back from my parents' house just so I could have it at my apartment. My back's been sore for a week.

The reason I hold this book in such high esteem is because of how it puts the relatively new field of game art into perspective, showing how concept art really just started off as crude sketches intended to communicate ideas to storytellers, designers and 3D modelers. How all of this focus on beautiful illustrations is really secondary to the core of a concept artist's job. A real eye-opener.

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  Reference
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Lesson 3: Applying Construction to Plants

Overview

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Prerequisites

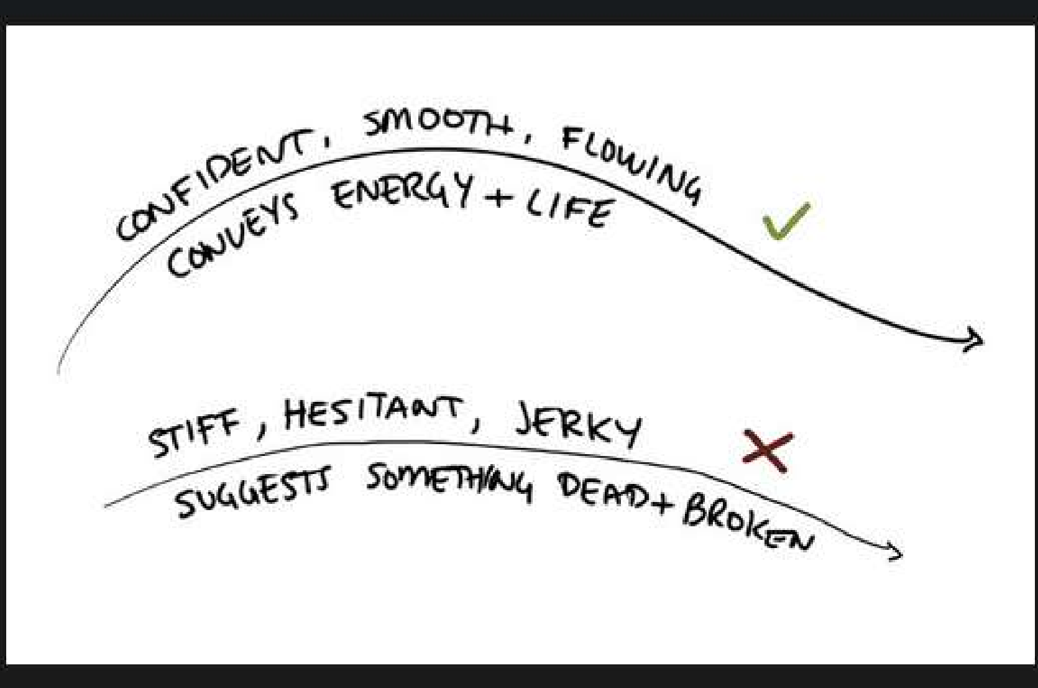
This marks the beginning of the 'Constructional Drawing' curriculum. At this point, I assume you've completed both lessons in The Basics section (Lesson 1 and Lesson 2). If you haven't, no matter how good you may be, I strongly recommend you complete them first. All the lessons on this website tackle drawing in a very specific manner, with specific techniques that are repeated throughout. These techniques are introduced in The Basics section, so if you miss them, you probably won't fully grasp what is explained here.

Introduction

To start us off, we're going to ease into the subject of drawing rather gently. Each topic will build on the last, gradually working you up. We are also using these different lesson topics to look at the topic of constructional drawing from many different angles.

I don't necessarily expect that upon completing this lesson, you'll be able to put all of the concepts I mention here into practice. Instead, I wish you to finish with a general understanding of what the concepts are on a theoretical level, an awareness of what you are doing wrong, and a target to aim for in the long term.

Due to how all of these lessons are structured, you will continue to develop the skills explored here in later lessons, so in the future, you may want to come back to this lesson and attempt the homework again - just to see how your skills have improved.

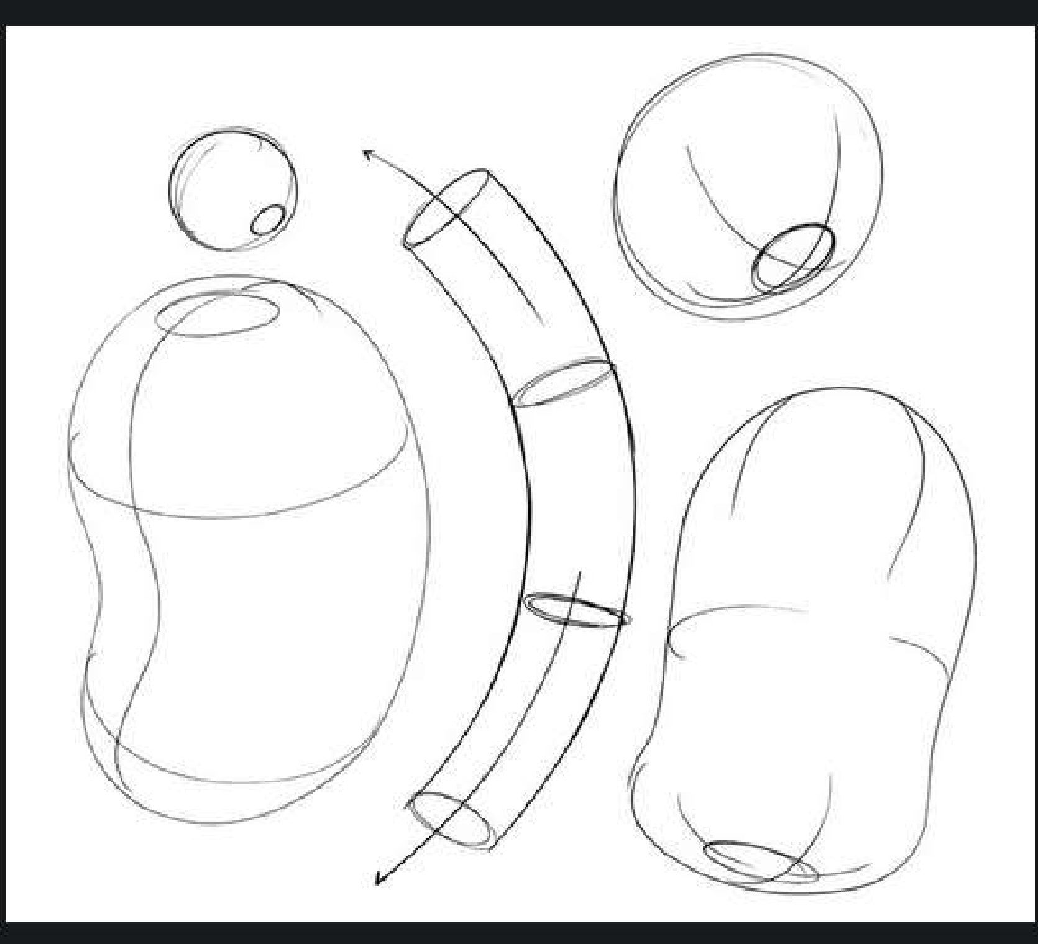


Flow

One of the most important concepts covered in this lesson is the importance of conveying how a form flows through 3D space. Things like leaves, petals and so on don't have any real solidity or mass to them. Being as thin and weightless as they are, they are entirely subject to the whims of the forces around them. Wind, airflow, drag, all of these forces are what determine just how a leaf will move through space.

When tackling anything that relies heavily on leaves, think about it like the arrows from lesson 2. Where a box may focus on its solidity in order to feel three dimensional, forms like leaves must emphasize their natural flowing nature - sometimes to the point of exaggeration.

More than anything, if you want your lines to flow smoothly, draw them confidently and from the shoulder. Don't hesitate, don't get overly careful and wobbly. Just push your lines through and commit to them.



Organics

Aside from the flat, flowing shapes of leaves and petals, the majority of your constructions will be done with a variety of organic forms. Organics are essentially combinations of balls and tubes, and are what we explored in lesson 2.

You can, and should, try and think of these in terms of flow as well, while also trying to convey their solidity and volume. It can be tempting to cover them with dozens of contour lines - **don't do that**. Every mark you put down should be evaluated based on what it's going to contribute to your drawing, and how that task can be accomplished best by the stroke. This means drawing a couple contour lines that do their job effectively, rather than many sloppy ones. If you find yourself wanting to put down a bunch, then you're probably doing something wrong.

Drawings as exercises

In the previous section, you were assigned very specific exercises. What we're doing here is not so different. Rather than our focus being to learn how to draw plants, we're using plants as an exercise to learn how to apply constructional techniques and to develop our understanding of space.

The end result is **not** our focus. As with any other exercise, its benefit comes from the process we follow, not how pretty the resulting drawing is. If you skip steps or ignore certain instructions in favour of achieving a cleaner, more *presentable* final drawing, you will be missing out on a good deal of what we are doing here.

If you're interested in exploring plants and how to draw them with a greater focus on flair/presentation, our sponsor **New Masters Academy** has you covered:

- Drawing Trees, Plants, and Landscape Compositions with Charles Hu
  This lesson from Charles' Dynamic Sketching course explores how to think about plants in a more compositional manner - paying attention to grouping, and overlapping structures to create interesting studies and scenes. His demonstrations include working with pen, markers, and gouache for colour.

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Homework and exercises

Before jumping into your own plant constructions, be sure to go through all of the technical exercises and demonstrations included in this lesson. I strongly recommend drawing along with them as well and following them closely when doing so. If you choose to, you can include your attempts at following the demos in your homework, but they should constitute less than half of your plant drawings.

Also, remember that this homework must be drawn from reference. When looking for reference, I recommend that you specifically look for those of a higher resolution. Google's image search tools allows you to limit your search to *large* images, and I recommend you take advantage of this.

The homework assignment for this section is as follows:

- 1 filled page of the Organic Arrows exercise from lesson 2.
- 1 filled page of the Leaves exercise.
- 1 filled page of the Branches exercise.
- 8 filled pages of plant drawings. The first 4 must have **no texture whatsoever, focusing only on construction**. The last 4 can have texture/detail but you are not required to go past the constructional phase for these either.

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here. You may also use a brush pen to fill in dark areas, but not for your linework.

Technical Exercises >>>

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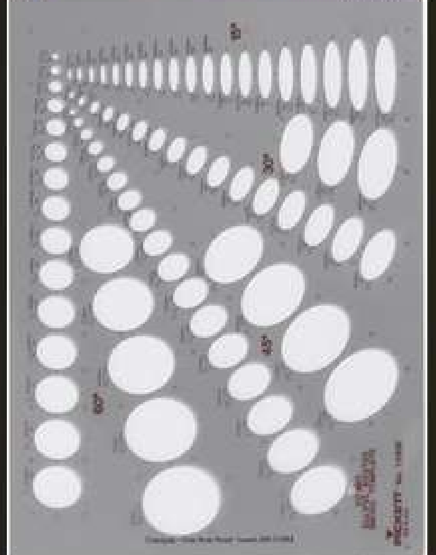

Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.

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- Reference
- Step by step

Mushroom Demo
- Demo Video
- Reference
- Step by step

Video Only Demos
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- Cactus Demo

Pitcher Plant Demo
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Potato Plant Demo
- Demo video
- Reference
- Step by step

Informal Demos
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- Common pitfalls
- Complex leaf structures
- Poles
- Full plant construction
- Leaf texture

Lesson 3: Applying Construction to Plants

Technical Exercises

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While the bulk of the work for the constructional drawing lessons will be focused on drawing from observation, here we're going to ease in with some exercises focused on specific technical challenges you will face.

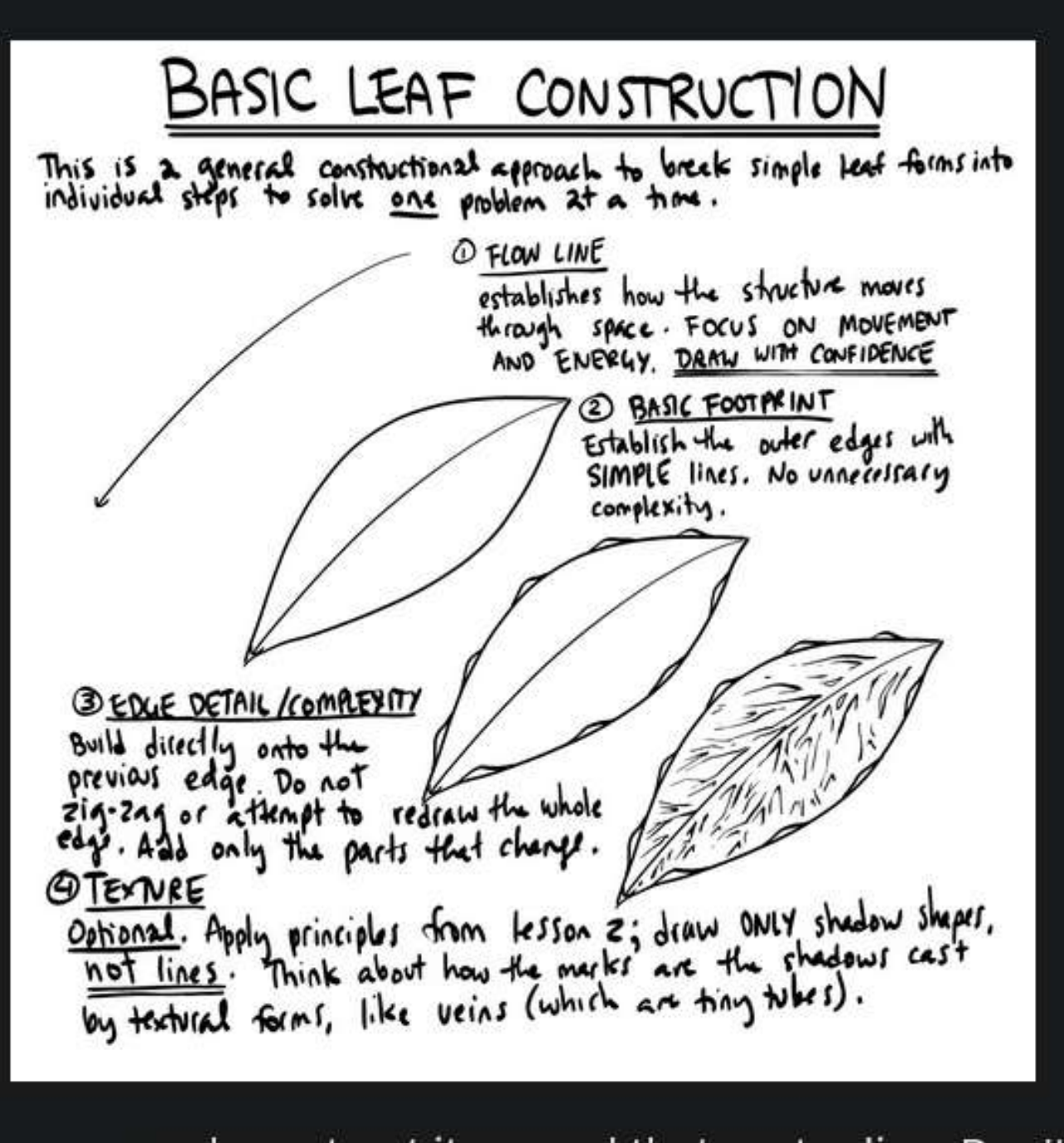
Drawing leaves

This exercise is about getting used to drawing leaves and other similar forms. The specific characteristics we're talking about when we're discussing leaves is that they're flat, but they flow through 3D space. This makes them extremely similar to the arrows exercise in lesson 2.

The great thing about leaves is that they very much stand as a representation of all the forces that are applied to them. Usually this is a matter of wind or air currents, but they are a physical object that will warp and shift to become a visualization of these forces.

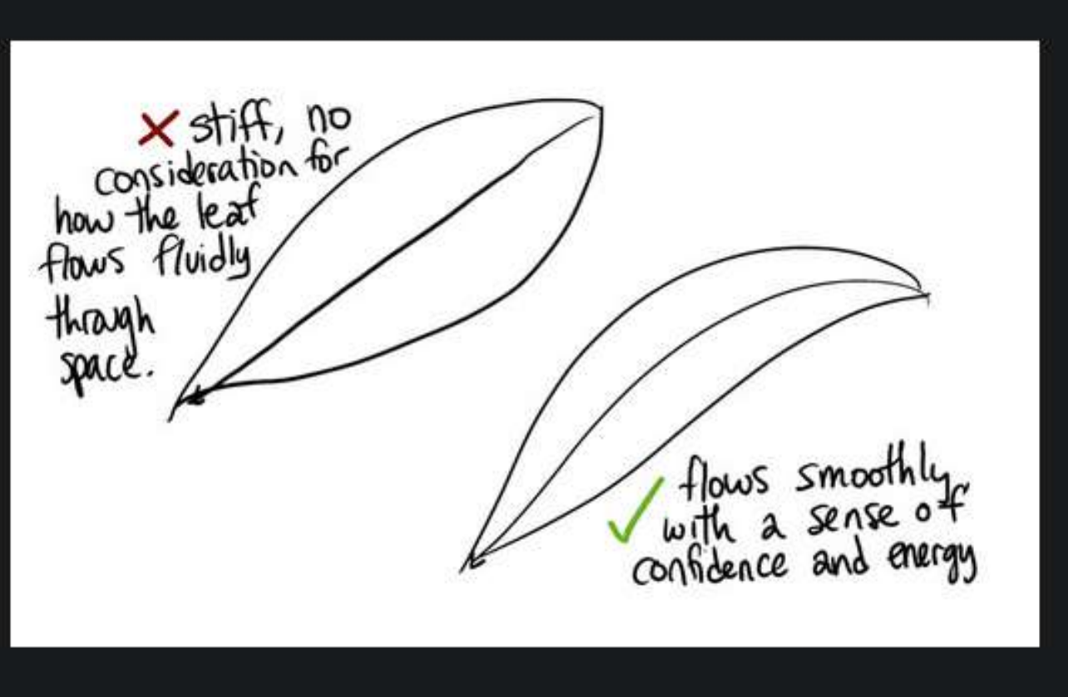
As such, I want you to think of these as being more than just static objects with a clear start and end point. Just as you would when doing the arrows exercise, think of the forces that push through these leaves, and draw them with an awareness of how they flow through space.

The leaves exercise


BASIC LEAF CONSTRUCTION
This is a general constructional approach to break simple leaf forms into individual steps to solve one problem at a time.
① FLOW LINE establishes how the structure moves through space. FOCUS ON MOVEMENT AND ENERGY. DRAW WITH CONFIDENCE
② BASIC FOOTPRINT Establish the outer edges with SIMPLE lines. No unnecessary complexity.
③ EDGE DETAIL/COMPLEXITY Build directly onto the previous edge. Do not zig-zag or attempt to redraw the whole edge. Add only the parts that change.
④ TEXTURE Optional. Apply principles from lesson 2; draw ONLY shadow shapes, not lines. Think about how the marks are the shadows cast by textural forms, like veins (which are tiny tubes).

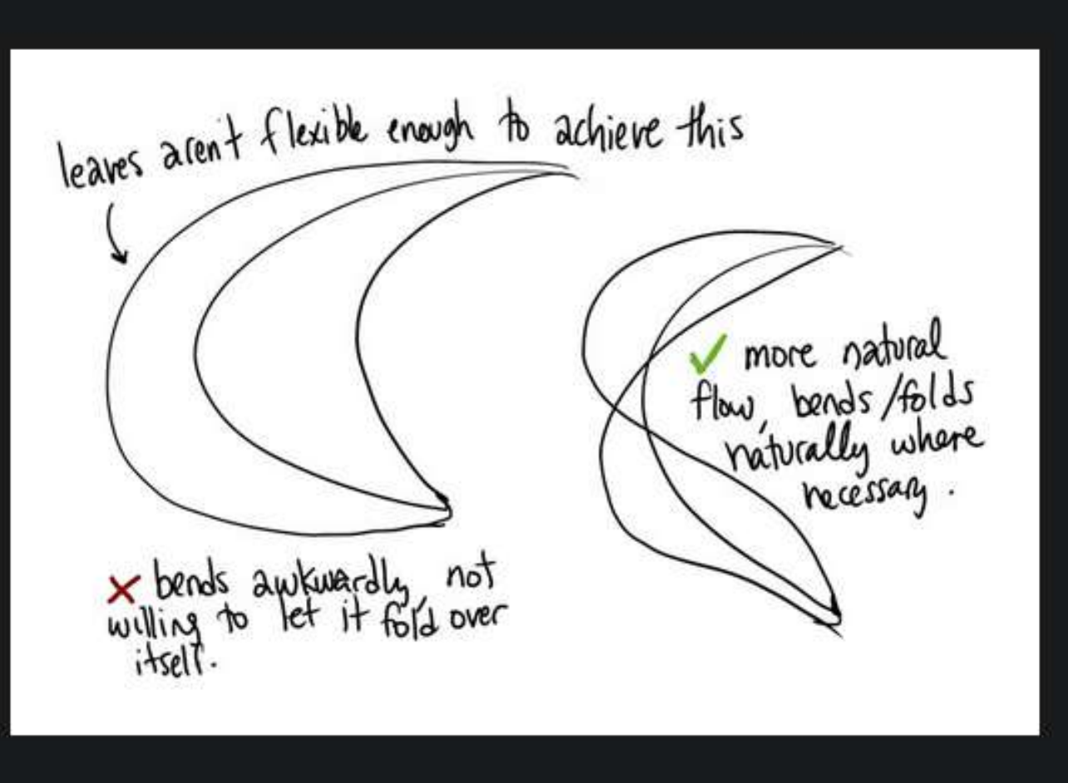
1. **The most important part is the center line, the spine of the leaf**. I can't stress enough how important it is to think about how this line moves through three dimensions, not across a flat page, and to really drive home how it **flows**. No part of the leaf is more important than this, as it represents the forces that drive the form as it flows through space. I frequently draw this with a little arrow head to remind myself of how confidently it pushes onwards.
2. Enclose the leaf with simple curves. I don't care how complex this leaf is, capture the core of it, its essence, in just two curves. No waves, no jagged edges, no complexity whatsoever. Focus on the flow of the shape, and construct it around that center line. Don't treat that line like some kind of a suggestion - it is a rule. Build your leaf around it.
3. Using reference images, add some more complex edge detail to your simple leaves. Do not zigzag back and forth - add individual bumps or cuts one at a time, coming off the existing, simple edge, and returning to it.
4. And finally, detail. Don't stress too much over this, it's the absolute least important part of the drawing. A leaf with poor underlying construction cannot be saved no matter how much detail you add - it'll still feel stiff and lifeless. A strong construction with no detail whatsoever however will still look fine.

Mistake: Stiff flow line


✗ stiff, no consideration for how the leaf flows fluidly through space.
✓ flows smoothly with a sense of confidence and energy

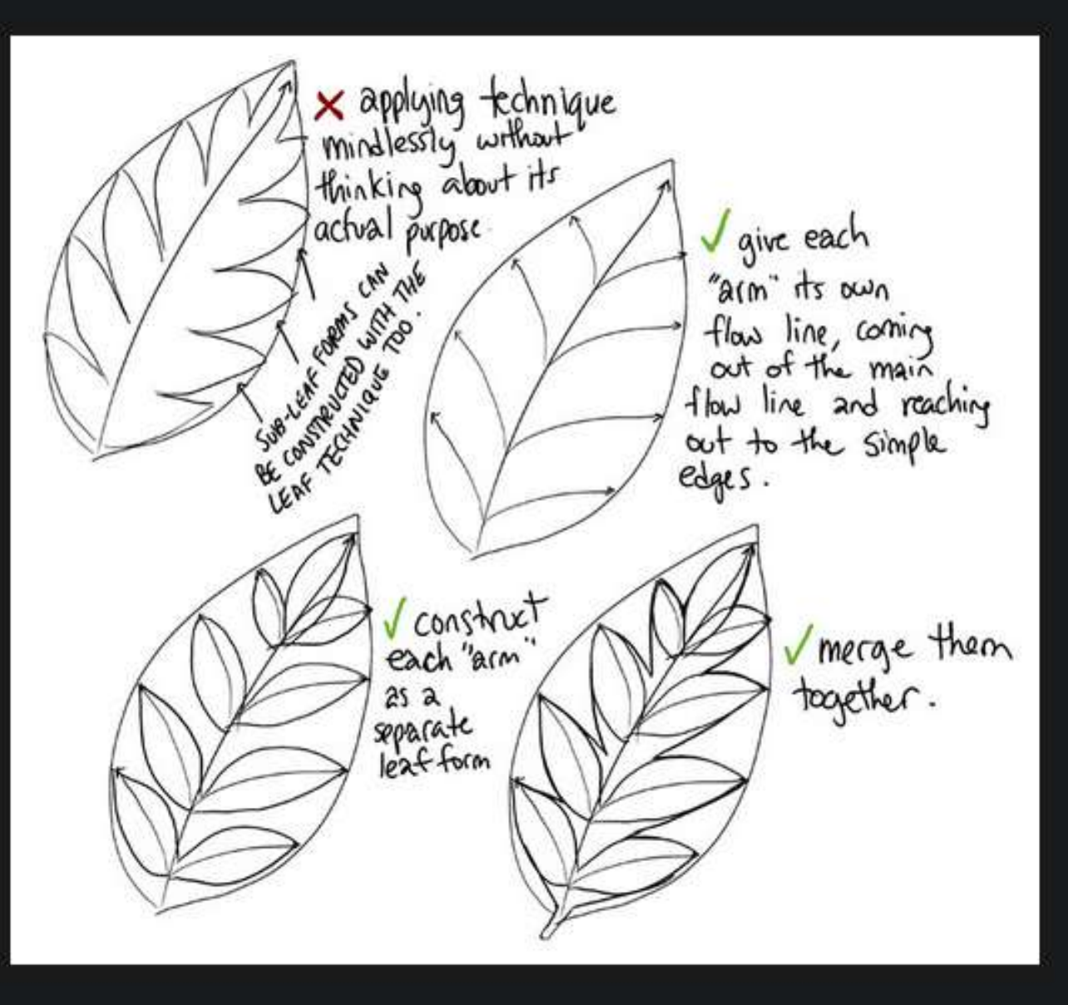
One common issue I see from students is the tendency to draw leaves (be it as part of this exercise, or when using the technique as part of their drawings) without much consideration for the flow line. This results in leaves that feel stiff and does not flow through 3D space in a convincing manner.

Mistake: Not folding naturally


leaves aren't flexible enough to achieve this
✗ bends awkwardly, not willing to let it fold over itself.
✓ more natural flow, bends/folds naturally where necessary.

It's pretty easy at first to end up being a little nervous about making your leaves twist and turn in three dimensions, but often times that is what is physically demanded, due to the fact that they don't stretch much. Don't be afraid to let your leaf fold back over itself - let the flow line determine your choices, not your anxiety in what will and won't look good.

Mistake: Skipping constructional steps

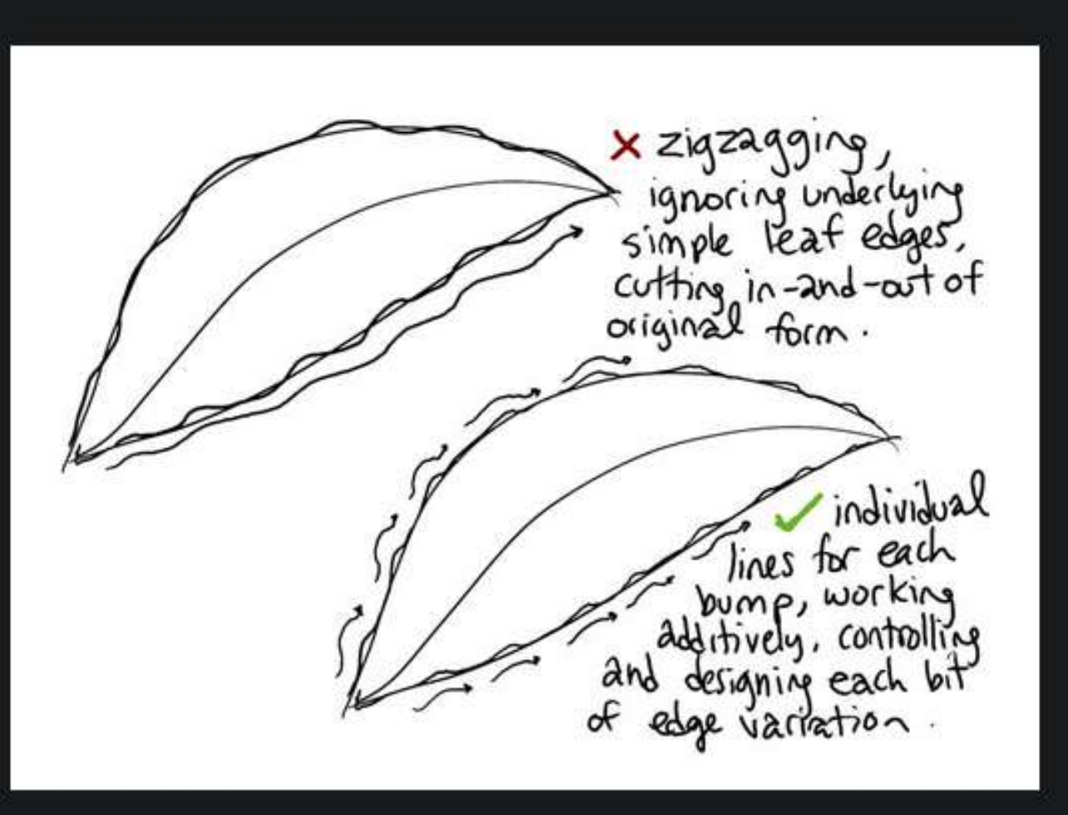

✗ applying technique mindlessly without thinking about its actual purpose.
SUB-LEAF FORMS CAN BE CONSTRUCTED WITH THE LEAF TECHNIQUE TOO.
✓ give each "arm" its own flow line, coming out of the main flow line and reaching out to the simple edges.
✓ construct each "arm" as a separate leaf form
✓ merge them together.

Construction is all about moving from simple to complex, breaking problems down into their most basic components and tackling only one challenge at a time. I often see students who see a leaf with many different 'arms', but who seek to apply the leaf construction method to the whole thing the same way every time, rather than thinking about *why* we employ these steps.

It's not that this is the only recipe that is going to work for every single leaf out there - it's that working around a dedicated line to determine how the form flows through space allows us to pin down that challenge before figuring out how the bounds of the leaf can be determined. If we jump straight into establishing the leaf 'shape', we have to handle both the flow and the surface area of the leaf simultaneously.

When tackling a leaf with multiple arms, you can absolutely start your basic leaf construction, establishing the flow and bounds of your overall shape, and then break internal components down by applying these steps to each individual arm. This will allow you to nail how each one's going to flow on its own, within the context of the larger leaf, before answering further questions.

Mistake: Zigzagging edge detail


✗ zigzagging, ignoring underlying simple leaf edges, cutting in-and-out of original form.
✓ individual lines for each bump, working additively, controlling and designing each bit of edge variation.

When adding detail like little waves or jagged edges to a leaf, don't do so by applying a single continuous zig-zagging stroke. If you remember back to markmaking in lesson 1, the third rule is to ensure that each stroke consists only of one trajectory.

This is easy to separate when you've got sharp corners, but when you're dealing with more rounded waves as shown here, it may be a little less clear. In general, rise up off the edge from your previous phase of construction and come back down to it, then lift your pen and start a new stroke for the next bump.

Additionally, wherever possible, work additively - don't cut back into what you've already drawn, as this often makes us think more about the flat shapes on the page, rather than the solid, 3D forms they represent. In this case you'll notice very clearly that along the top edge of the correct example, I've come up off the edge and back down to it.

The other side however does *seem* to cut back into the leaf, but if you think about it in three dimensions, it doesn't. Instead, those edges are being lifted up slightly from their previous position, rather than being cut into.

There will be times when you cannot avoid having to work subtractively, but you should always do your best to see if there is a way to make additive construction work.

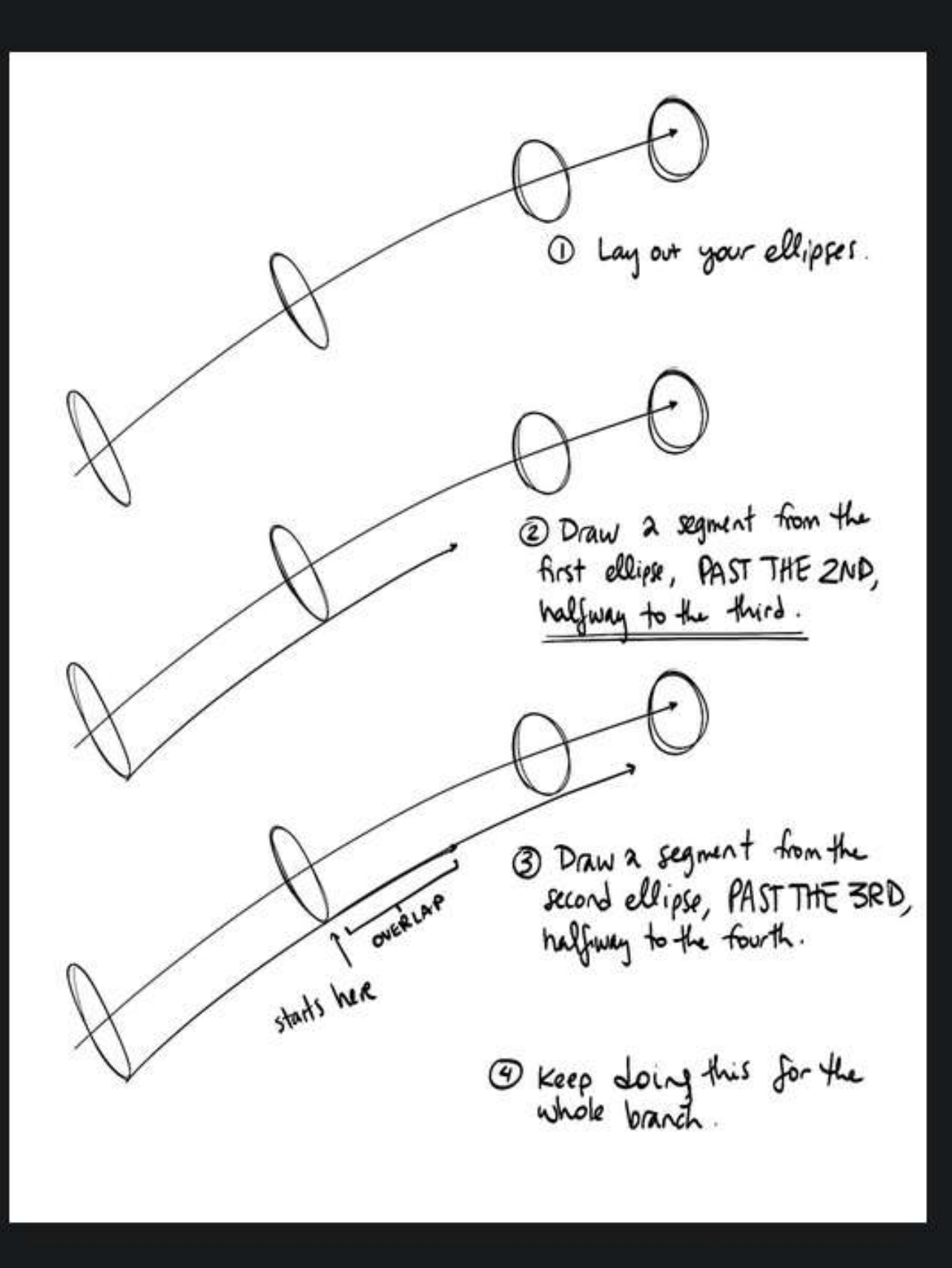
Drawing branches

Another thing people tend to struggle with is stems, branches, and that sort of thing. Much of the challenge comes from the fact that these things are skinny and long, leaving very little room for drawing well shaped contour lines that wrap convincingly around the cylindrical shaft. This exercise focuses on taking the opposite approach - starting off with ellipses, and then constructing a tube around them.

This exercise exposes you to several important things. First off, the importance of the minor axis in relation to how ellipses should be aligned. Secondly, considering a tube to be a connected chain of ellipses, where those ellipses' degree reflect their orientation relative to the viewer.

Now, one thing is certain - this is not easy. The most difficult part is drawing the actual edges of the tube, connecting up the ellipses. You'll see that even in my example, some are worse than others. We'll discuss certain approaches to overcoming this challenge, but a lot of it comes down to practice. Also rotate your page. A lot.

The branches exercise


① Lay out your ellipses.
② Draw a segment from the first ellipse, PAST THE 2ND, halfway to the third.
③ Draw a segment from the second ellipse, PAST THE 3RD, halfway to the fourth.
OVERLAP
starts here
④ Keep doing this for the whole branch.

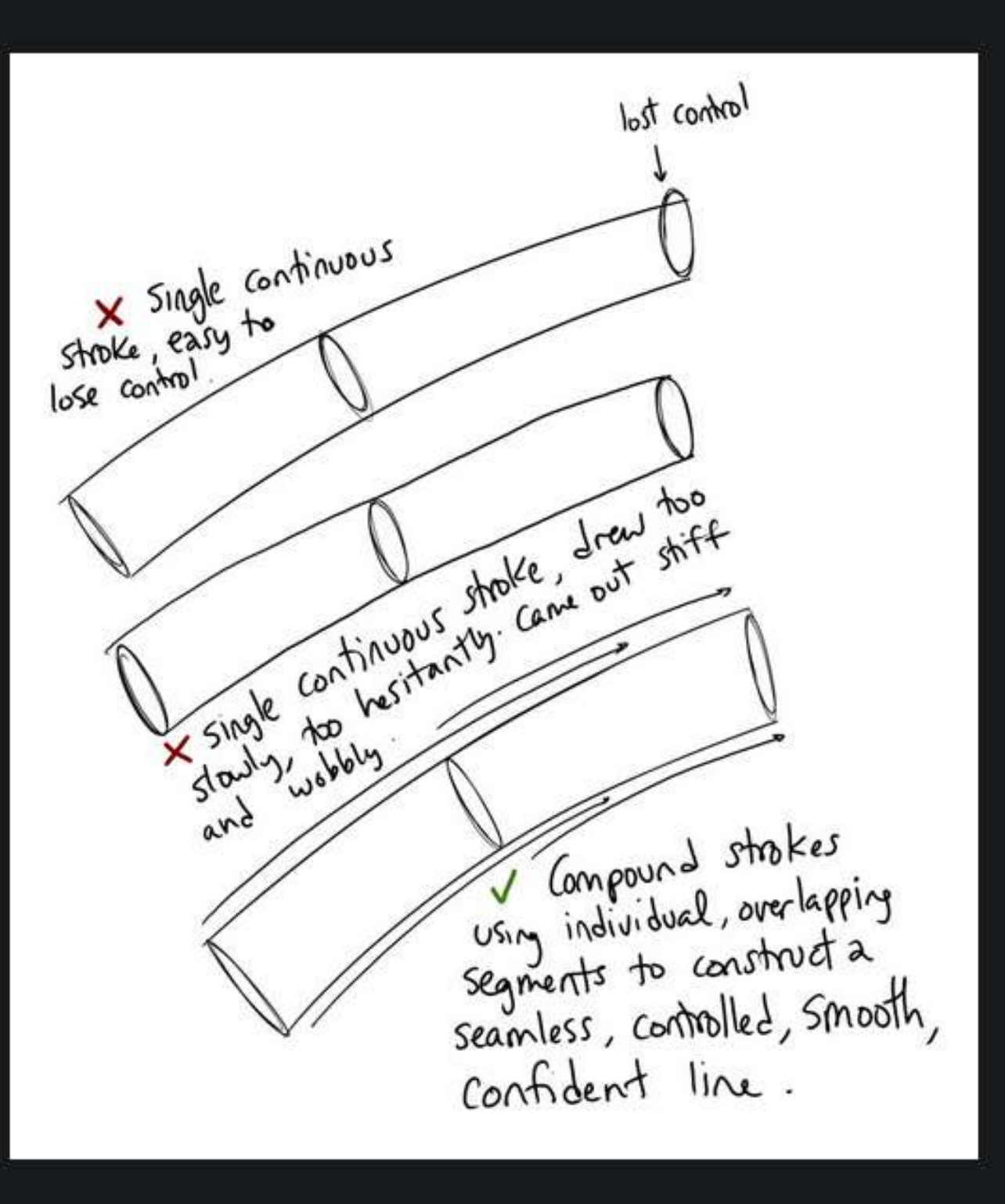
1. Again, just like the leaves, start off with a simple line. It drives how your tube flows through space. Place ellipses along the line, being sure to align them to the line as their minor axis. I cover this in Lesson 1 as well as in the 250 Cylinder Challenge, but basically the minor axis cuts the ellipse into two equal, symmetrical halves down its narrower dimension. Also, consider the degree when drawing the ellipses - how fat or skinny the ellipse is is a product of how the circle it represents is turned in space. If it's narrower, it's turned away. If it's wider, it's turned towards the viewer. One way to think about this is holding up a CD and turning it slowly. As the tube flows through space, it will turn, so some of its cross-sections will be facing the viewer, while others will face away.
2. Draw the edges of the tube by connecting the ellipses. Drawing curved lines can be very difficult, especially when they have to match a very specific criteria. **Do not draw a line from one ellipse to the other and stop**. Instead, overshoot the second ellipse, trying to follow the path towards the third one and stopping **fully halfway there**.
3. Then go back to that second ellipse and repeat the process. Use that last half chunk of the previous segment as a runway, overlapping it directly (even if it went off course) and then continue on.

After enough practice - and this is a long ways away - you will find yourself being able to manage two, or three segments at a time. If you feel a segment is just too long and too curvy to manage, throw an extra ellipse in there to bridge the gap.

Start off simple, for at least half of the page. Then try playing around with it. Try adding small clusters of two or three ellipses close together, and once your basic branch has been constructed, place a ball between them to create a bulge or knot, as one sometimes sees in plant stems and branches. You can also try to add an additional branch sprouting from this bulge. You'll find more information on this sort of thing at the bottom of this page. When doing so, make sure your intersection points are clearly defined with ellipses, as it's these intersectional cross-sections that really reinforce the illusion of form.

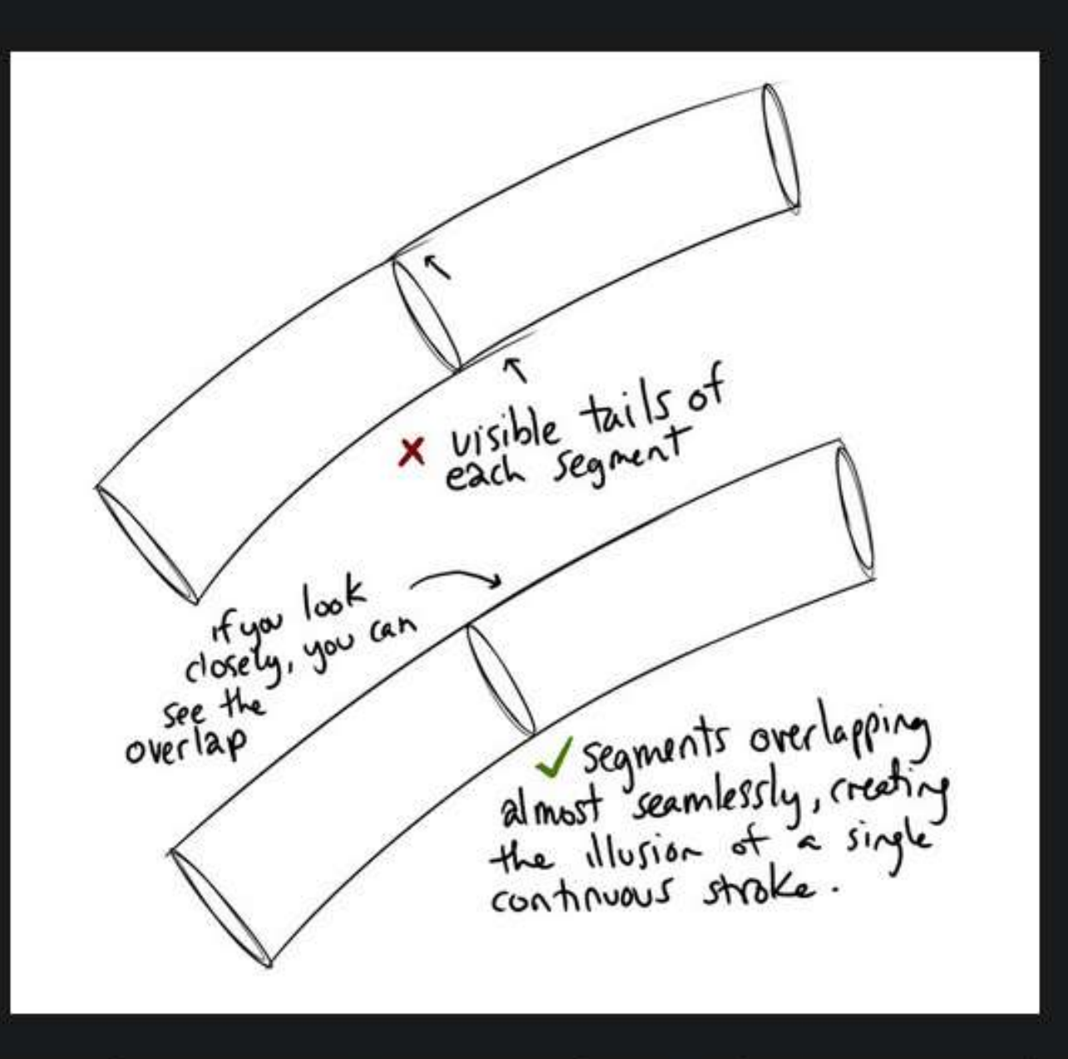
Absolutely **NEVER** leave a tube open-ended, even if your image cuts off there. Always cap it off with an ellipse.

Mistake: Drawing whole edge in one stroke


lost control
✗ Single continuous stroke, easy to lose control.
✗ Single continuous stroke, drew too slowly, too hesitantly. Came out stiff and wobbly.
✓ Compound strokes using individual, overlapping segments to construct a seamless, controlled, smooth, confident line.

While we do focus heavily on building our ability to draw singular, continuous lines (as per the markmaking rules from lesson 1), there are situations where we are faced with long, complex curves that we simply cannot achieve in a single stroke. In these situations, we draw these longer lines in segments (what I will call a compound stroke), making sure to overlap these segments and have them flow smoothly and seamlessly from one to the next. It is something like a more planned, far better executed approach to chicken-scratch, but without the mess that comes with it.

Mistake: Visible tails in a compound stroke


✗ visible tails of each segment
if you look closely, you can see the overlap
✓ Segments overlapping almost seamlessly, creating the illusion of a single continuous stroke.

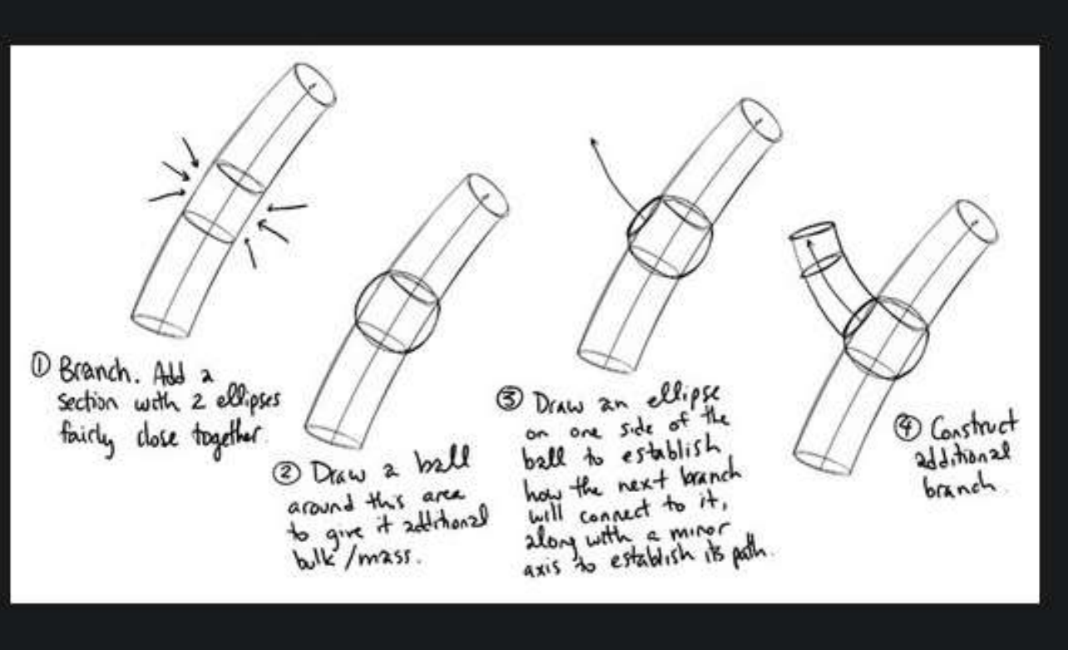
While this is absolutely a mistake, it's one all of you will make, and it will be a matter of practice in order to reduce and ultimately eliminate them. So while you will see them in your work, just keep in mind that the goal is to make sure you're doing your best to limit their presence there.

When we produce a complex stroke by combining several together, it is critical that they flow smoothly together. This means, in the context of the branches exercise, drawing a stroke from one ellipse, **past the next one**, and some ways towards the third as we lift our pen off the page. Ideally this means our next stroke (starting from the second ellipse, going past the third and aiming towards the fourth) will perfectly overlap the previous one.

If however we fail to aim that last length correctly, then when we will see a divergence, where the previous line forms a bit of a visible tail, sticking out from the side of our compound stroke. This is what we want to work to reduce with practice.

Along with ghosting your each stroke before executing it, one thing that may help is to try extending that line half way towards the next ellipse before pulling up, as well as placing the ellipses far enough apart to ensure that "halfway" is a good enough length of runway. You're more likely to end up with a stiff or improperly aimed tail if you haven't got much room to work with.

Forking branches

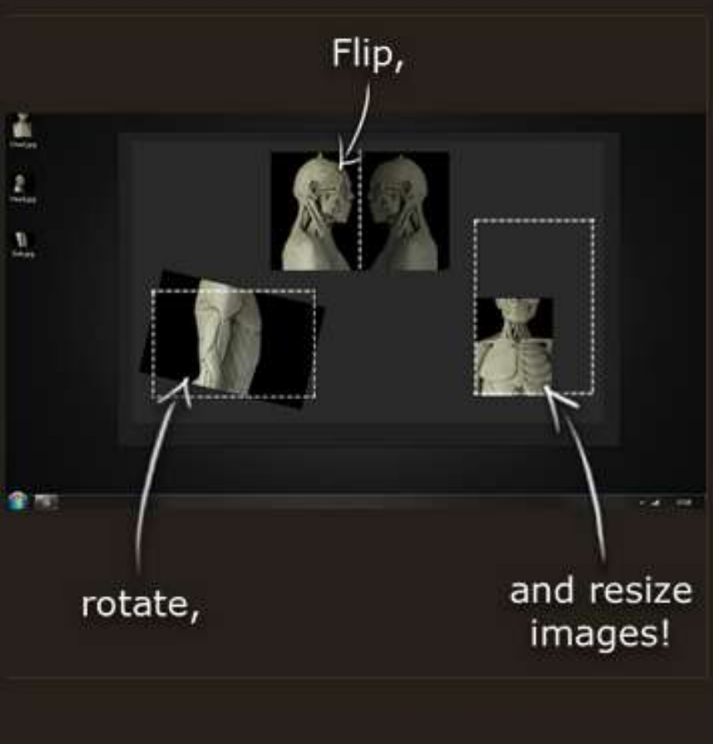

① Branch. Add a section with 2 ellipses fairly close together.
② Draw a ball around this area to give it additional bulk/mass.
③ Draw an ellipse on one side of the ball to establish how the next branch will connect to it, along with a minor axis to establish its path.
④ Construct additional branch.

Once you're more comfortable with the issues listed above, you can play with creating forking branches and knots, as shown here. Make sure that your initial branch forms are drawn with a consistent width, and that you're only focusing on one such branch at a time - when focusing on constructing one element, don't think ahead to the next, so you don't end up splitting your attention.

<<< Overview

Daisy Demo >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.



PureRef

This is another one of those things that aren't sold through Amazon, so I don't get a commission on it - but it's just too good to leave out. PureRef is a fantastic piece of software that is both Windows and Mac compatible. It's used for collecting reference and compiling them into a moodboard. You can move them around freely, have them automatically arranged, zoom in/out and even scale/flip/rotate images as you please. If needed, you can also add little text notes.

When starting on a project, I'll often open it up and start dragging reference images off the internet onto the board. When I'm done, I'll save out a '.pur' file, which embeds all the images. They can get pretty big, but are way more convenient than hauling around folders full of separate images.

Did I mention **you can get it for free**? The developer allows you to pay whatever amount you want for it. They recommend $5, but they'll allow you to take it for nothing. Really though, with software this versatile and polished, you really should throw them a few bucks if you pick it up. It's more than worth it.

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Lesson 3: Applying Construction to Plants

Daisy Demo

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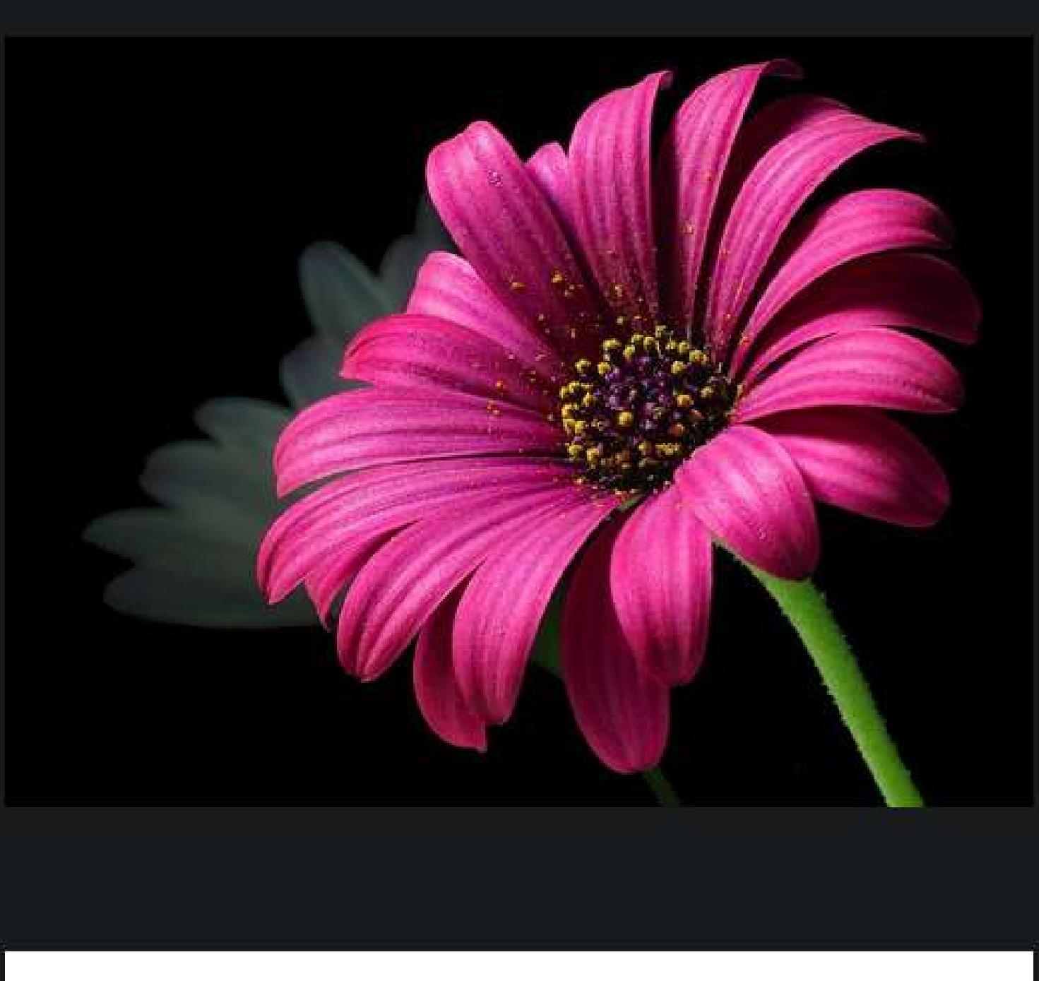
Demo Video

Here we look at tackling a flower, using the principles of leaf construction and applying them to a different, but similar form that follows the same principles of being flat and following the flow of external forces.

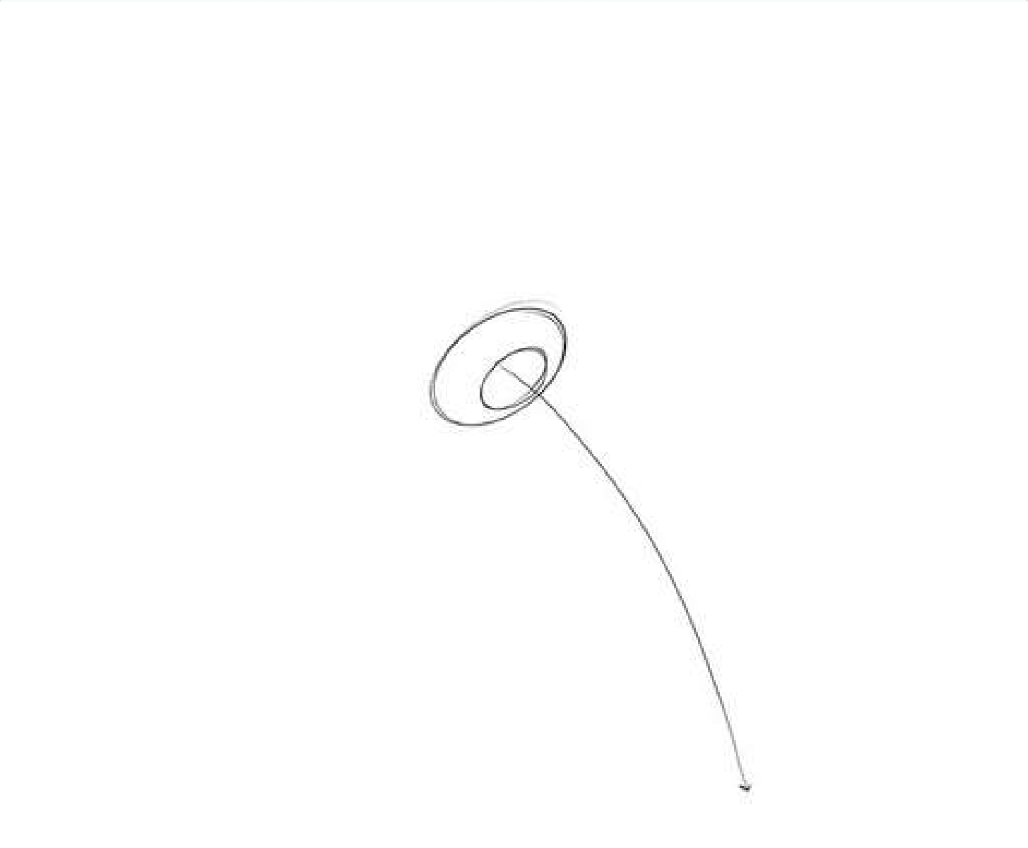
The demo video includes full audio and discussion of the concepts demonstrated in the drawing.

Reference

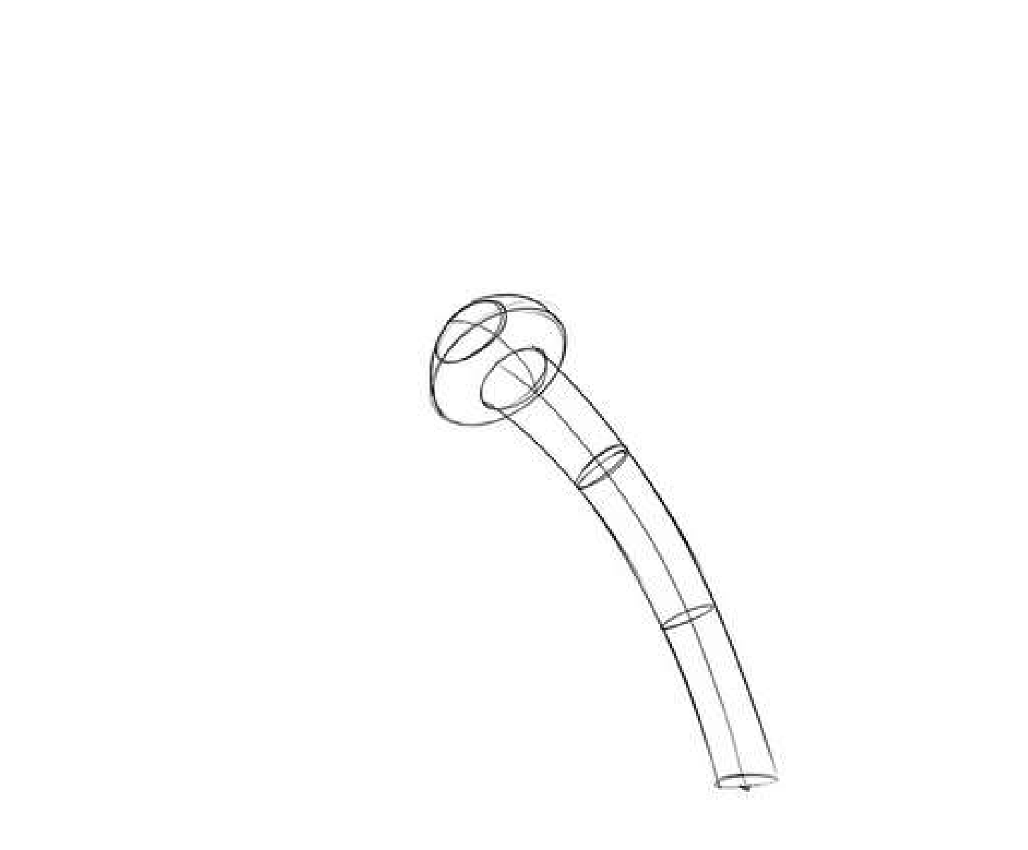


Here's the reference image we'll be working from. It's clearly got a number of flowing petals that all come out from a central point, we'll be focusing on these primarily.

Step by step



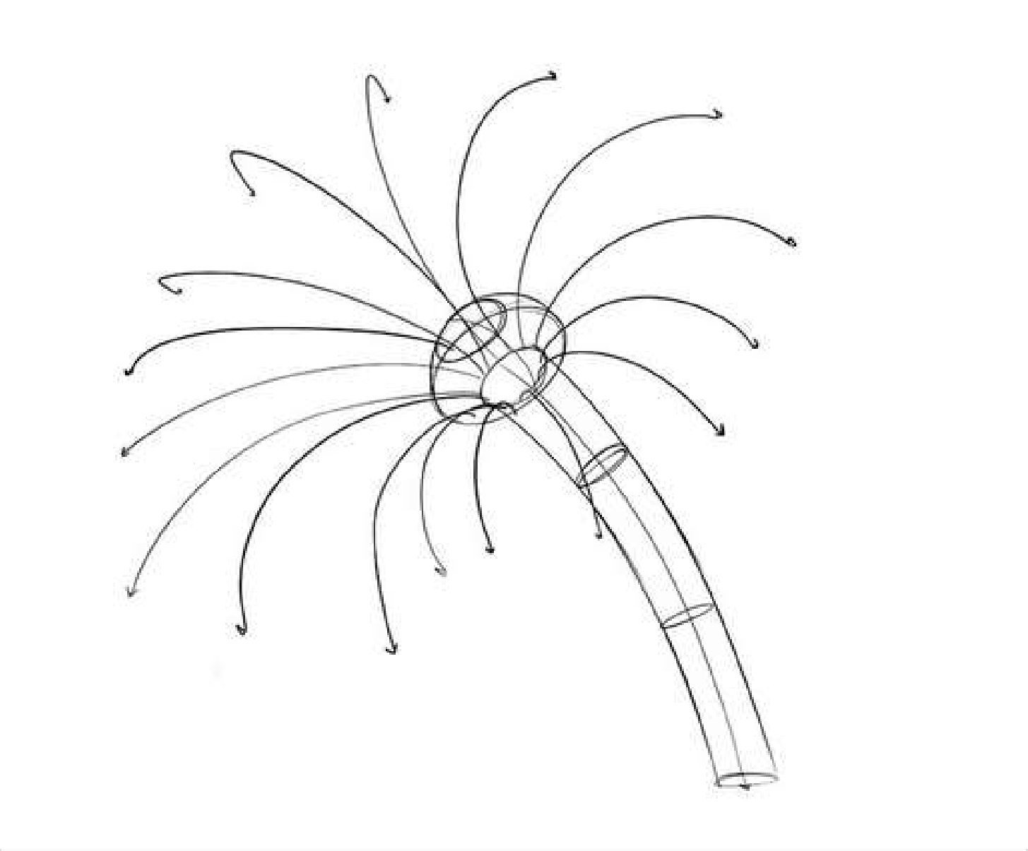
We start out with just a few marks. First we want to establish the path the stem is going to follow, and ultimately how it connects to the head of the flower. We've done this with a flowing line (the arrow coming down and to the right), and a couple of contour ellipses to start establishing the base of the flower's head.



Applying the branch construction technique covered earlier in the lesson, we draw a stem along the path we established in the previous step.

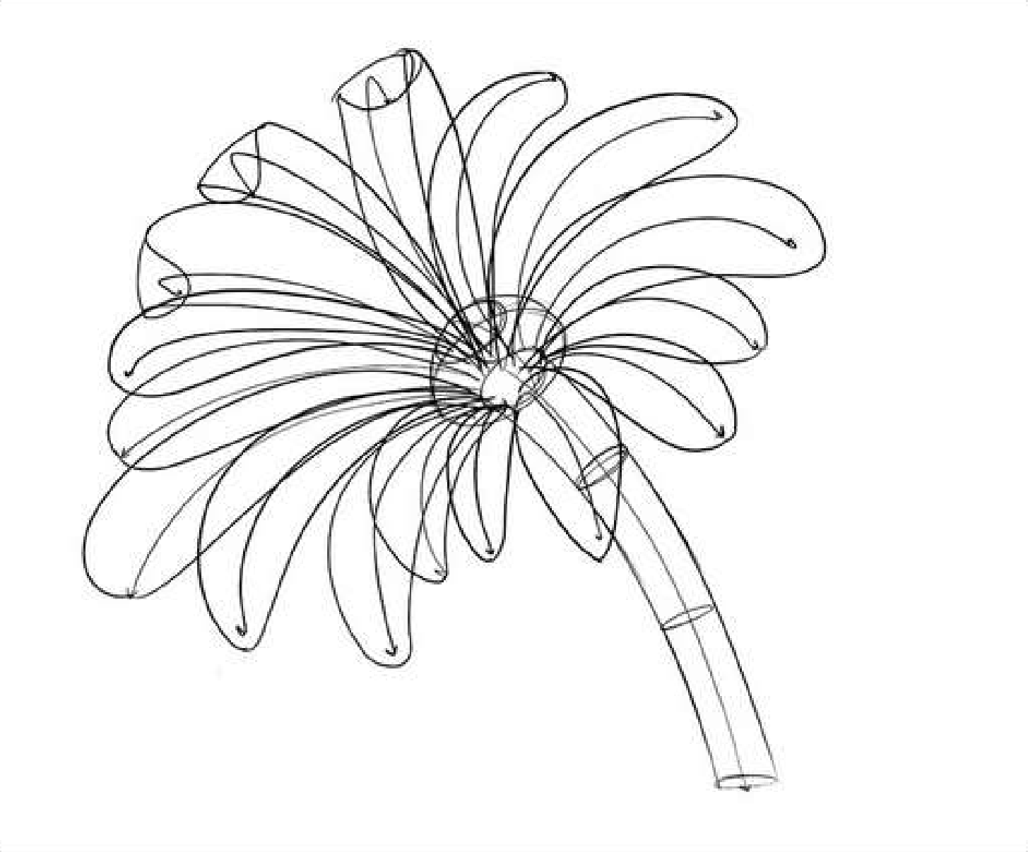
Remember that in order to maintain control over this longer curve, we're building it up in segments that go from one ellipse past the next. As we lift our pen, we aim that stroke towards the ellipse that follows. The goal here is to have each segment we construct overlap the previous one, causing them to blend smoothly into a continuous stroke.

We've also added a bit of a hemisphere or dome form to help build out the core from which all the petals flow.



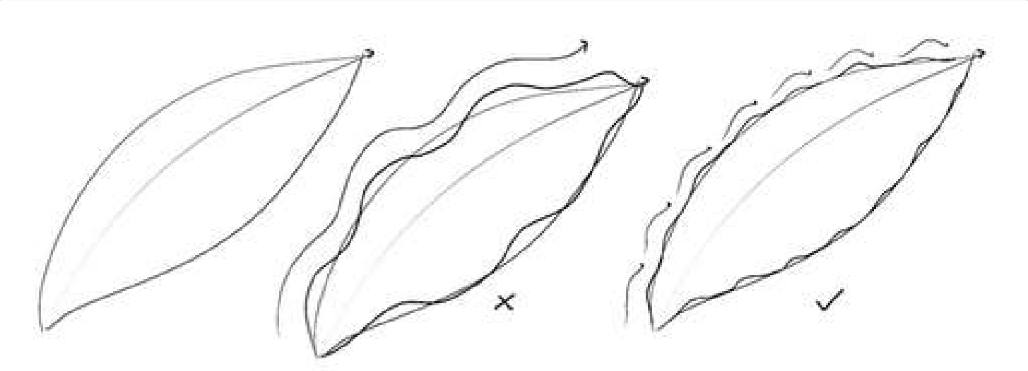
For each individual petal, we've constructed a separate "flow" line, as covered in the leaf construction exercise. While these are petals, and not leaves, the same principle applies because both are relatively flat and as such are heavily impacted by the flow of wind and air currents that surround them. You'd apply the same tactic to any such object or form.

Make sure you're drawing each flowing line with confidence and with consideration for how those forces are going to be pushing on your leaf. Don't draw shallow, stiff lines - take your time, apply the ghosting method, and don't half-ass it. The flow line is the core that defines the behaviour of each leaf or petal.



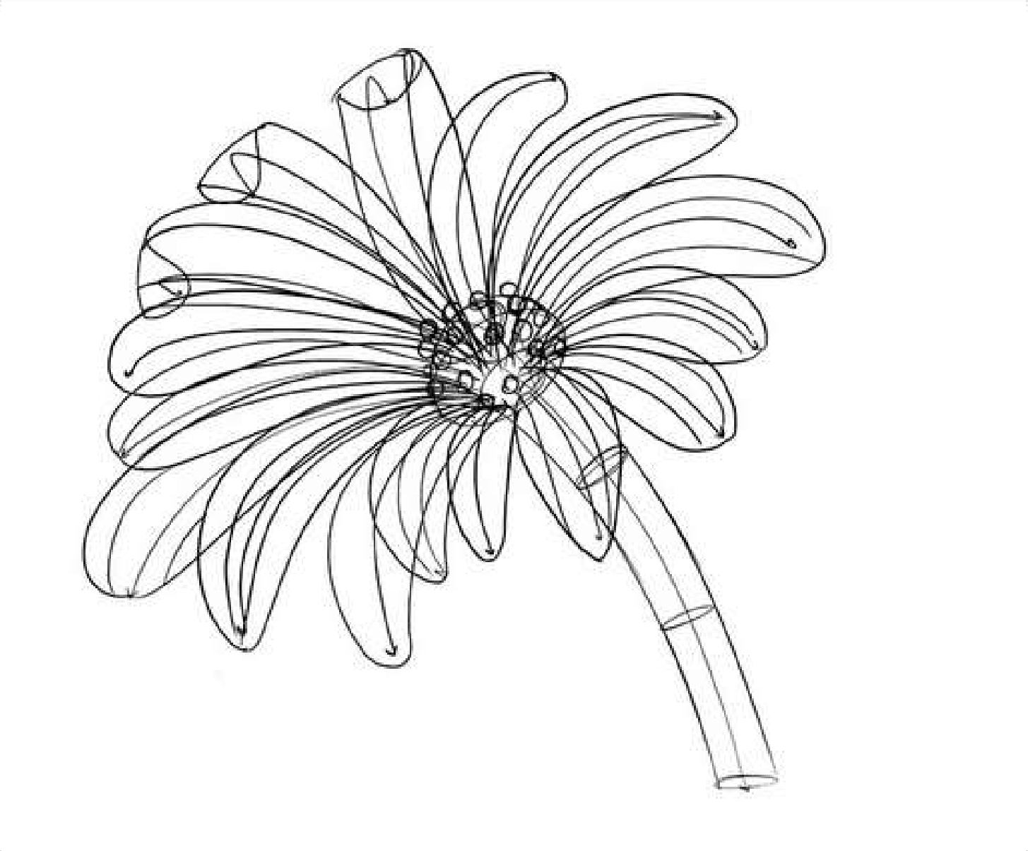
Again, following the leaf construction method, enclose the flow line from tip to tip with two edges, creating the overall shape of the petal. Do your best to have the petal end where the flow line does, and push through those lines with confidence again.

Don't be afraid to let the petals fold back on themselves. All we're doing is guiding lines that flow through space.

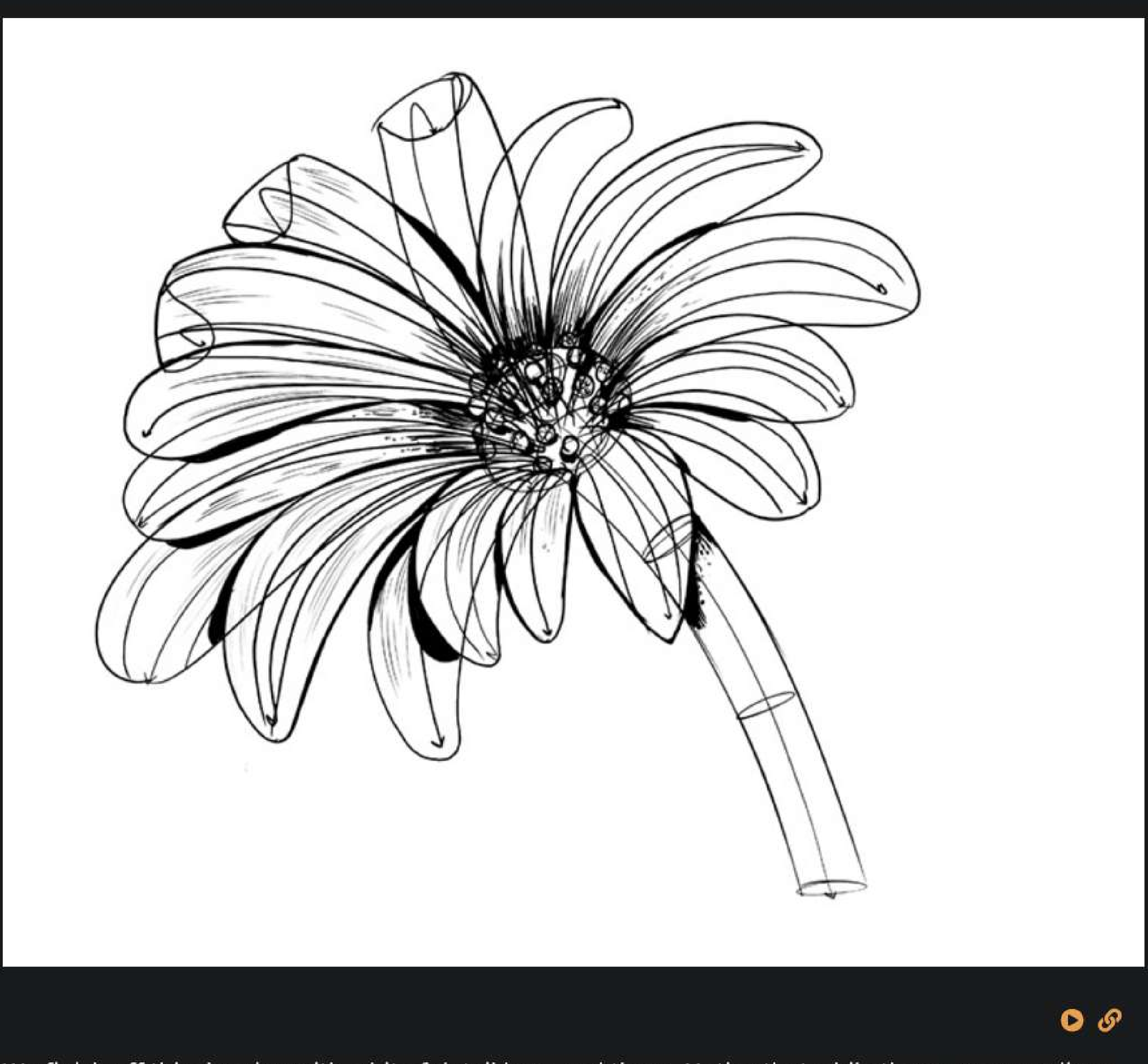


Now the petals on this flower are pretty simple, but if you ever need to add any edge detail like wavy, fraying or spiky edges, avoid the following:

- Zigzagging your lines, each deviation from the previous phase of construction should be drawn as a separate stroke, maintaining the basic mark making rule of each stroke maintaining only a single trajectory.
- Ignoring the initial enclosing edge of the shape - your details should always come off that initial edge and then return to it.
- Working subtractively - don't cut back into your basic leaf shape, or any form if you can help it. Work additively, always attaching new forms to those you've already established in space. Subtractive construction, while a viable option, usually requires far more spatial awareness of both the form already on the page and the piece you're cutting away, and it's very easy just to think about them as they exist in 2D, thus flattening out your drawing.



At this point, the main focus of this demo is over. I'm paying a bit of attention to the pollen and other flowery bits towards the center, fleshing some of those forms out as little balls, but I won't be taking that very far.



We finish off this drawing with a bit of detail here and there. Notice that while there are many lines running lengthwise along the petals (which you can see in the reference image as well), each one should be drawn with care, to follow the same flow of the petal itself. I'm also allowing these strokes to taper a lot more, by applying much less pressure, though the confidence of the stroke is still more important. If you aren't mindful of each stroke that rests on a surface in your drawing, you risk contradicting the construction you've already laid down.

<<< Technical Exercises
Mushroom Demo >>>

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Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.

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- Leaf texture

Lesson 3: Applying Construction to Plants

Mushroom Demo

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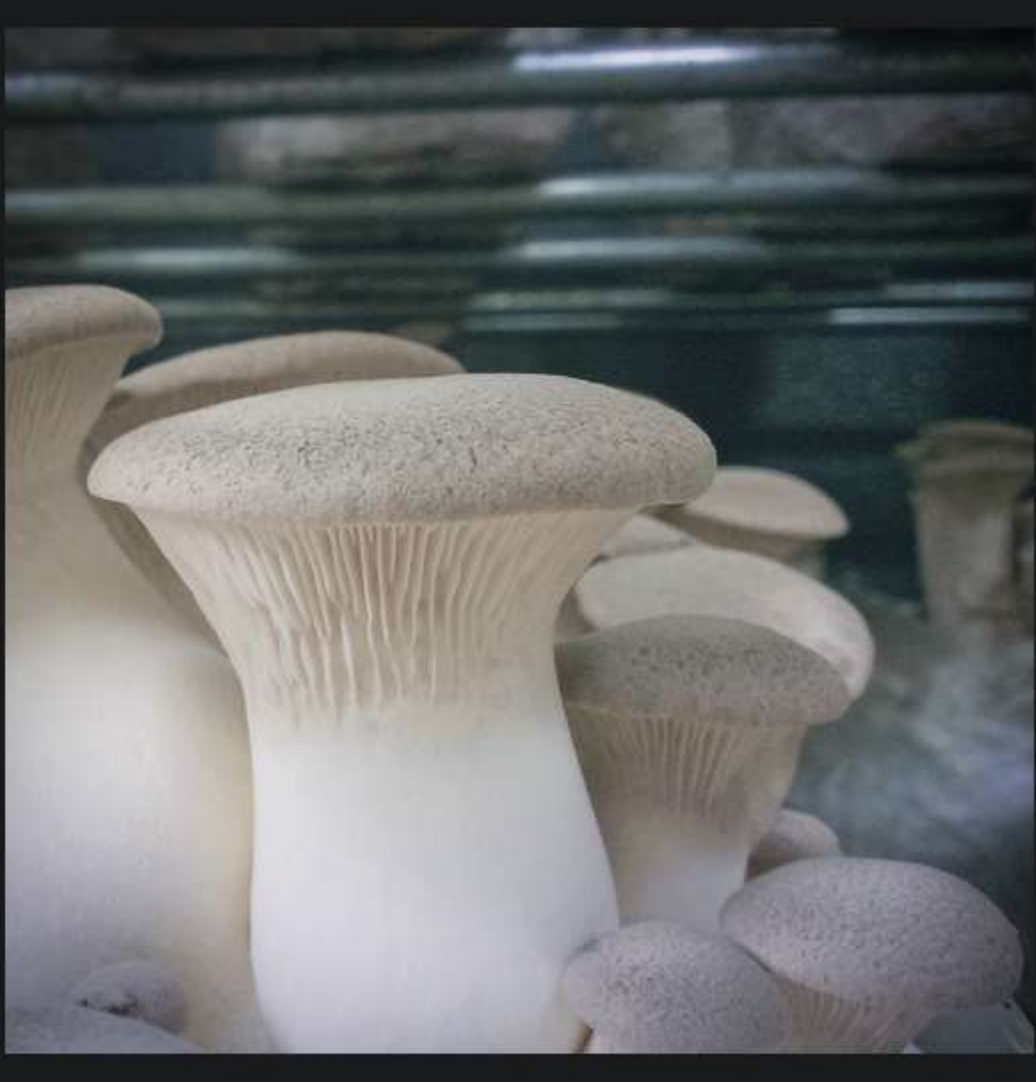
Demo Video

While this lesson primarily focuses on leafy plants, there are a number of plants and fungi that serve as an excellent introduction to working with basic organic forms, and mushrooms are a great example of this.

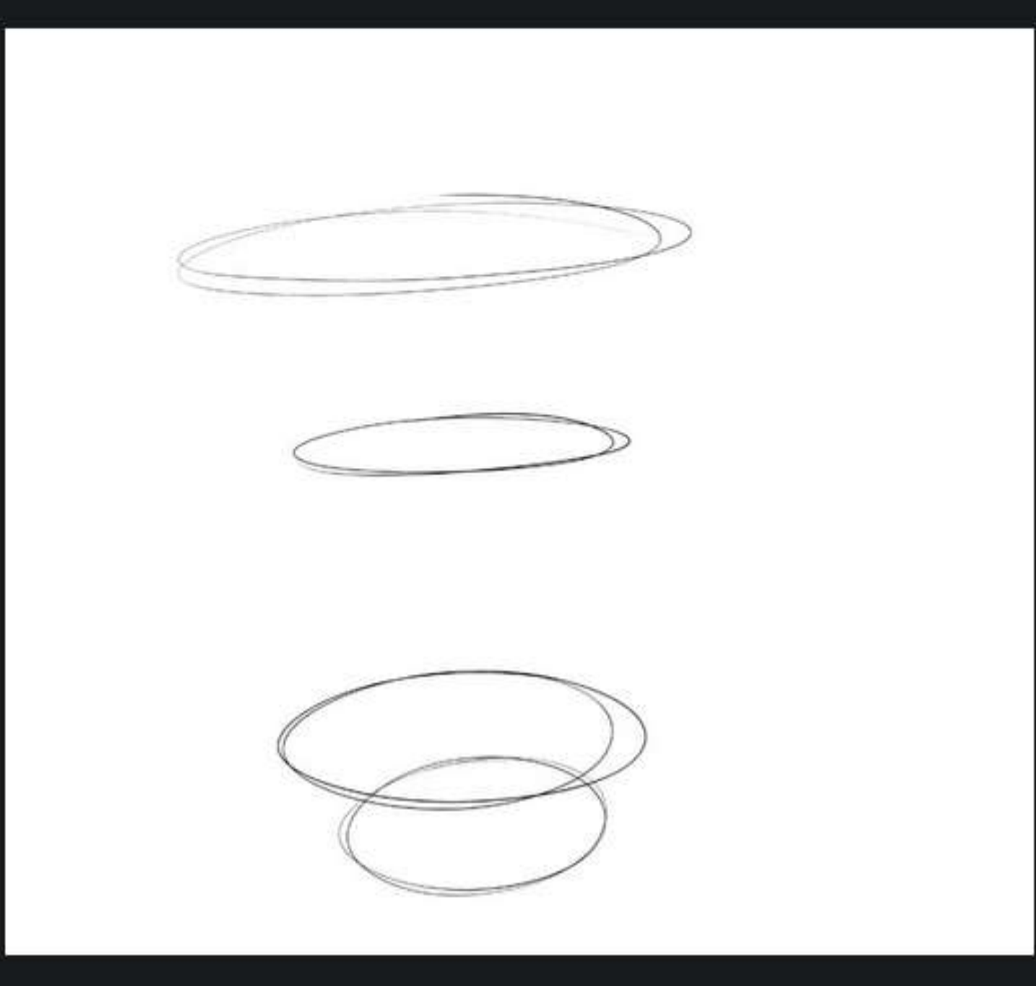
The demo video includes full audio and discussion of the concepts demonstrated in the drawing.

Reference



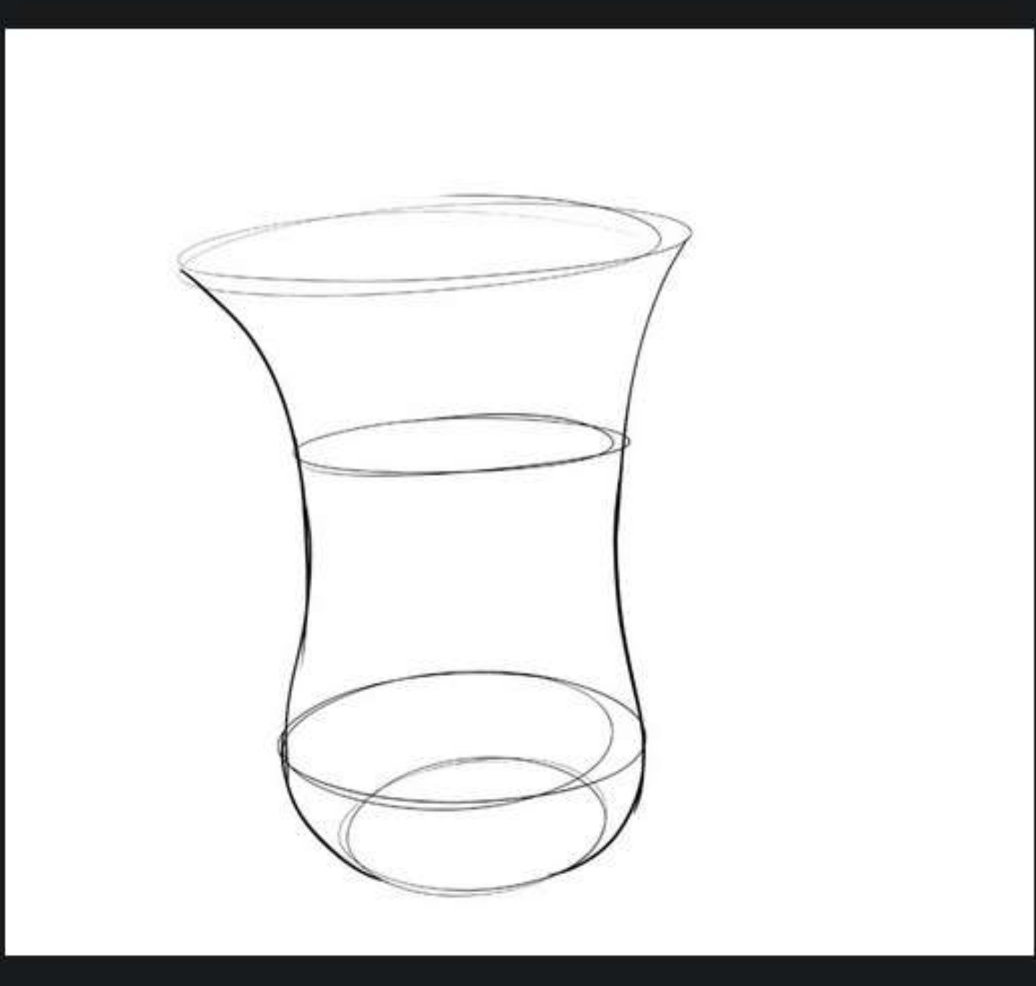
The reference we're using for this demo is a king's oyster mushroom. I specifically chose it because it has some really nice volumes, and because it doesn't look too much like a particular piece of human anatomy - unlike virtually every other mushroom I found.

Step by step

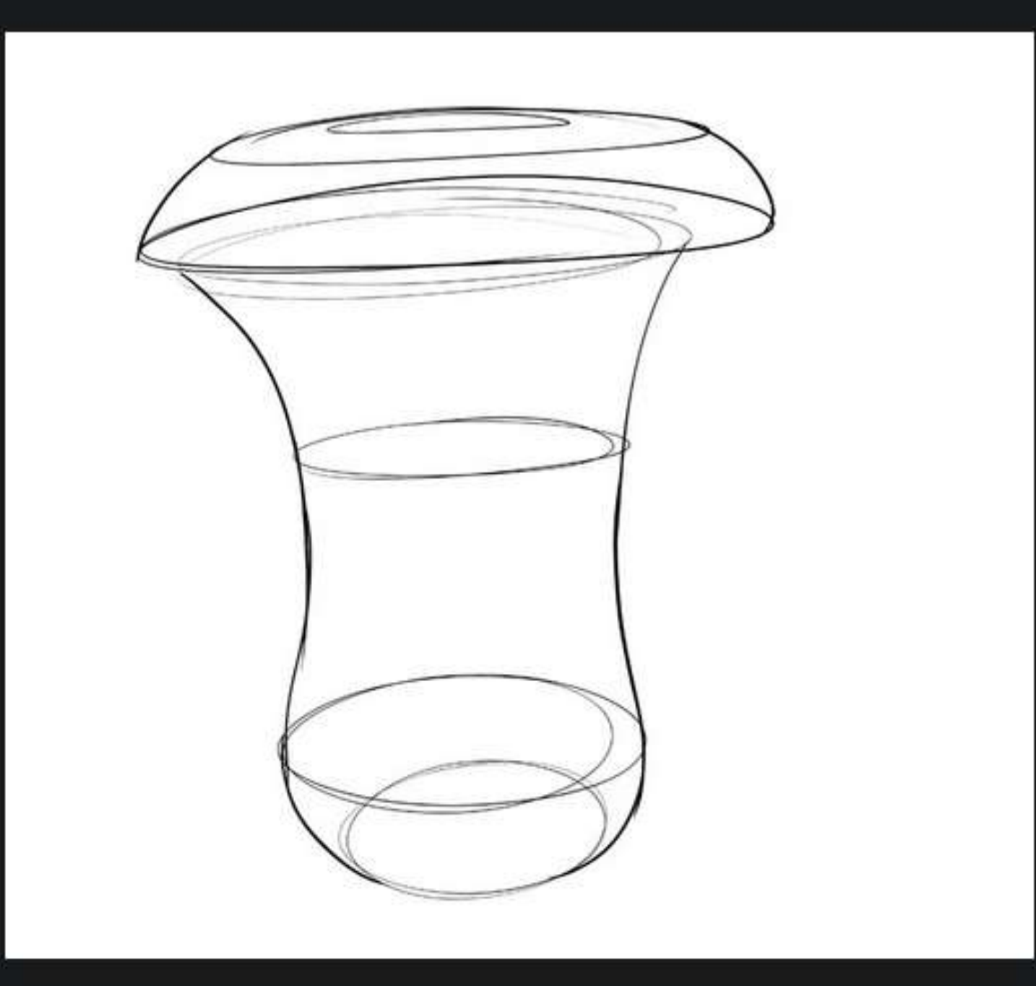


To start with, I lay down some ellipses to establish cross-sections along the length of our mushroom's stalk. Being that this is very much like a cylinder, the same principles do apply. For example, we certainly would benefit from aligning these ellipses to a single minor axis line - and if you struggle at all with keeping them aligned to each other, I would definitely recommend this.

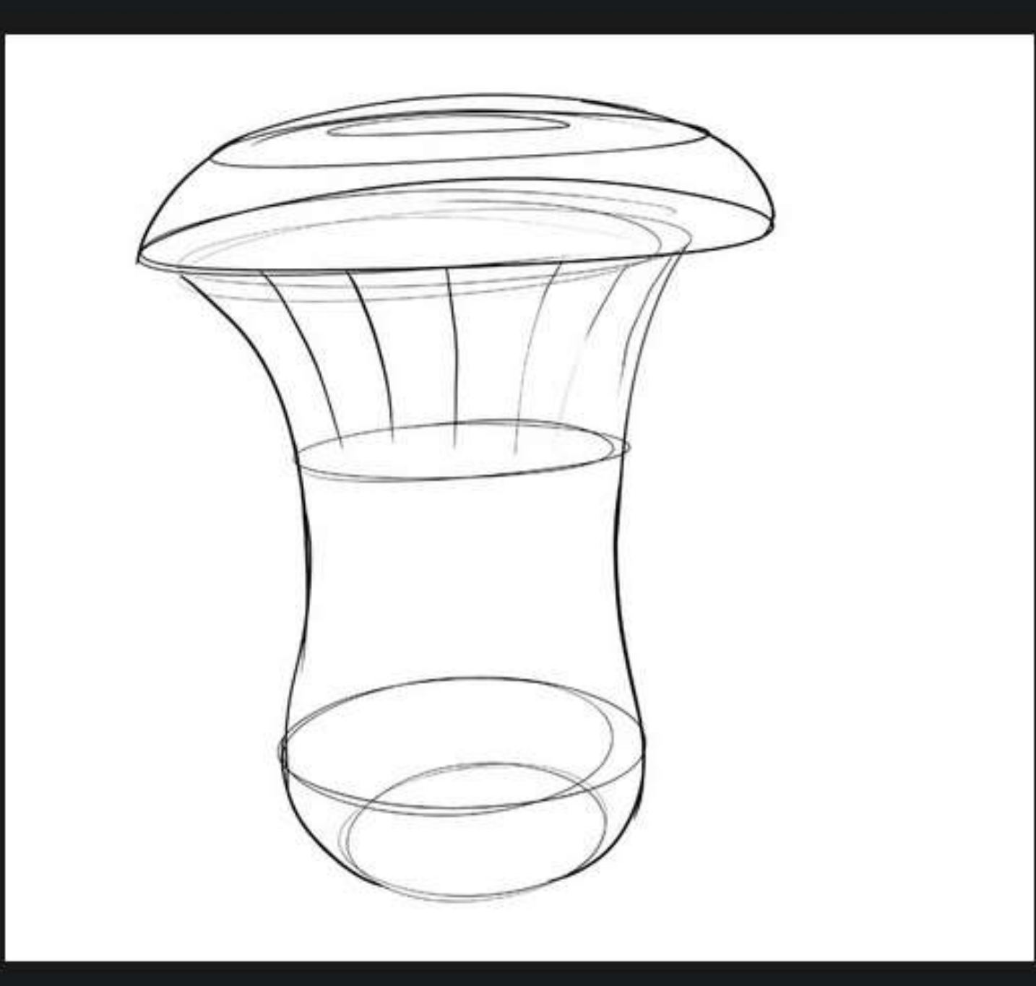
A less optional point to follow is the fact that the degree of these ellipses shifts visibly as you move from top to bottom. The topmost ellipse is more in line with the viewer's eye level, so we see less of its surface. As the cross-sections move further down, the angle at which we see it becomes greater, resulting in more of that surface being visible to us.



Next, using a similar technique to the branch construction exercise, we build the outlines of the mushroom stalk's silhouette. Because these curves are rather complex, I've built them in segments, doing my best to keep them overlapping and flowing directly into one another so as to avoid any visible ends peeking out in between.

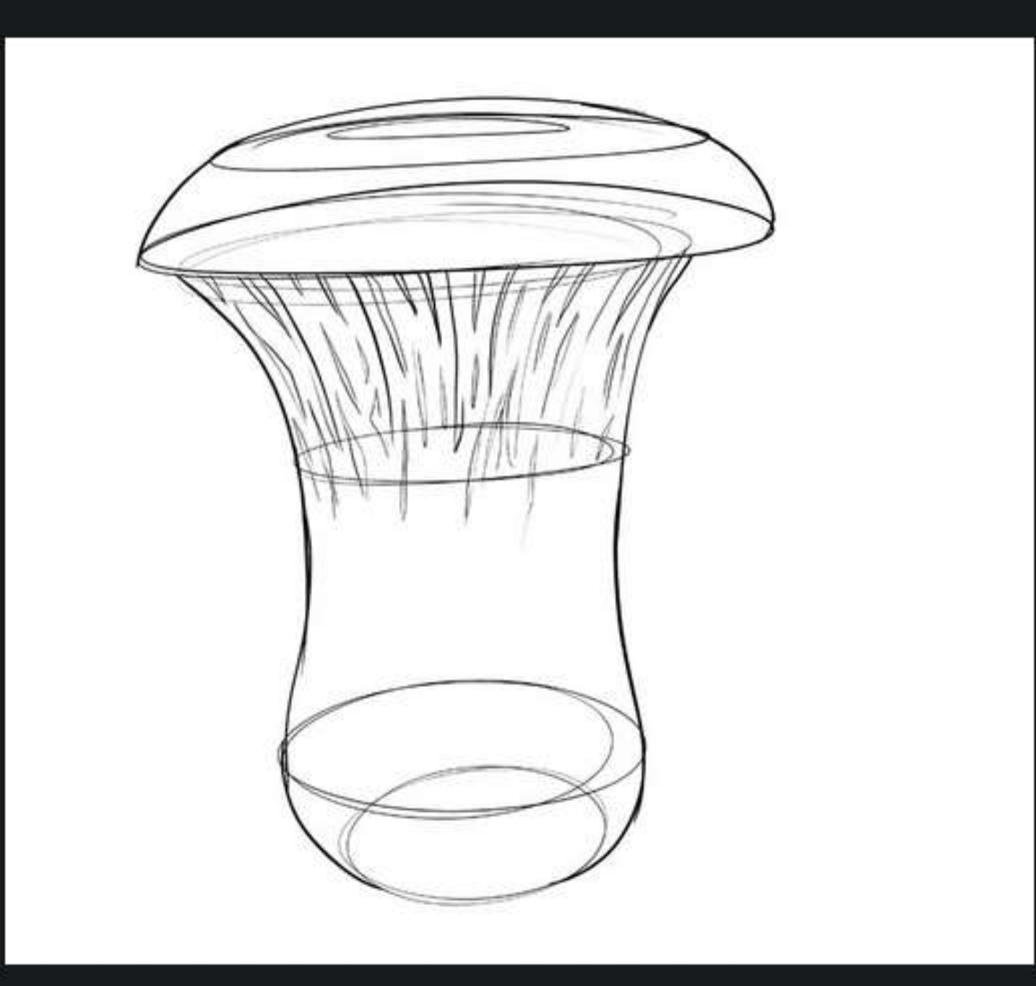


With the mushroom stalk constructed, I apply the same approach to constructing the cap. At this point, our construction is basically complete. It's a dead simple form with just two major components, and we've got them both constructed here.

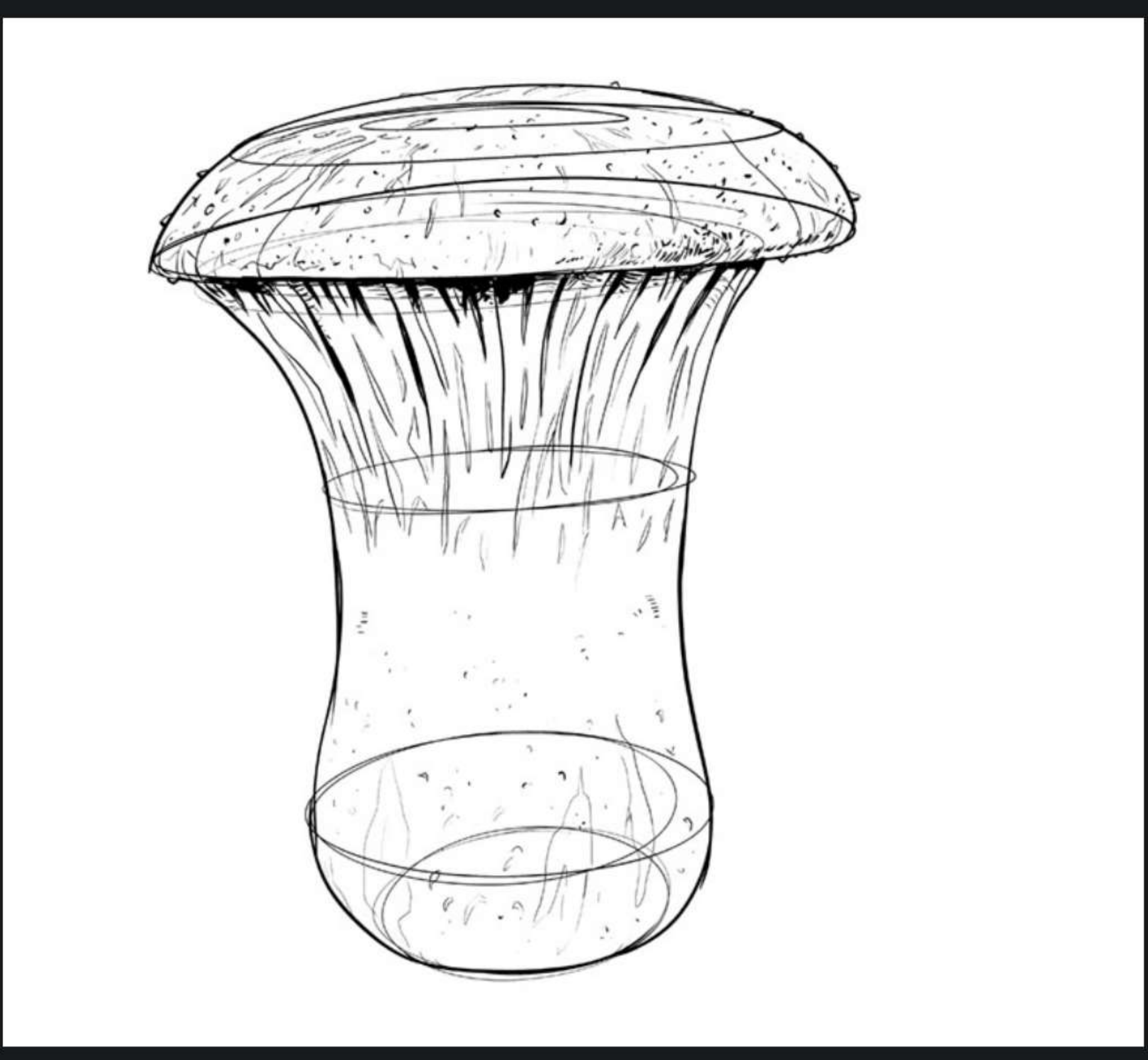


Now we start to move into the territory of detail. To start with, there's a lot going on directly underneath the cap, along the top of the stalk.

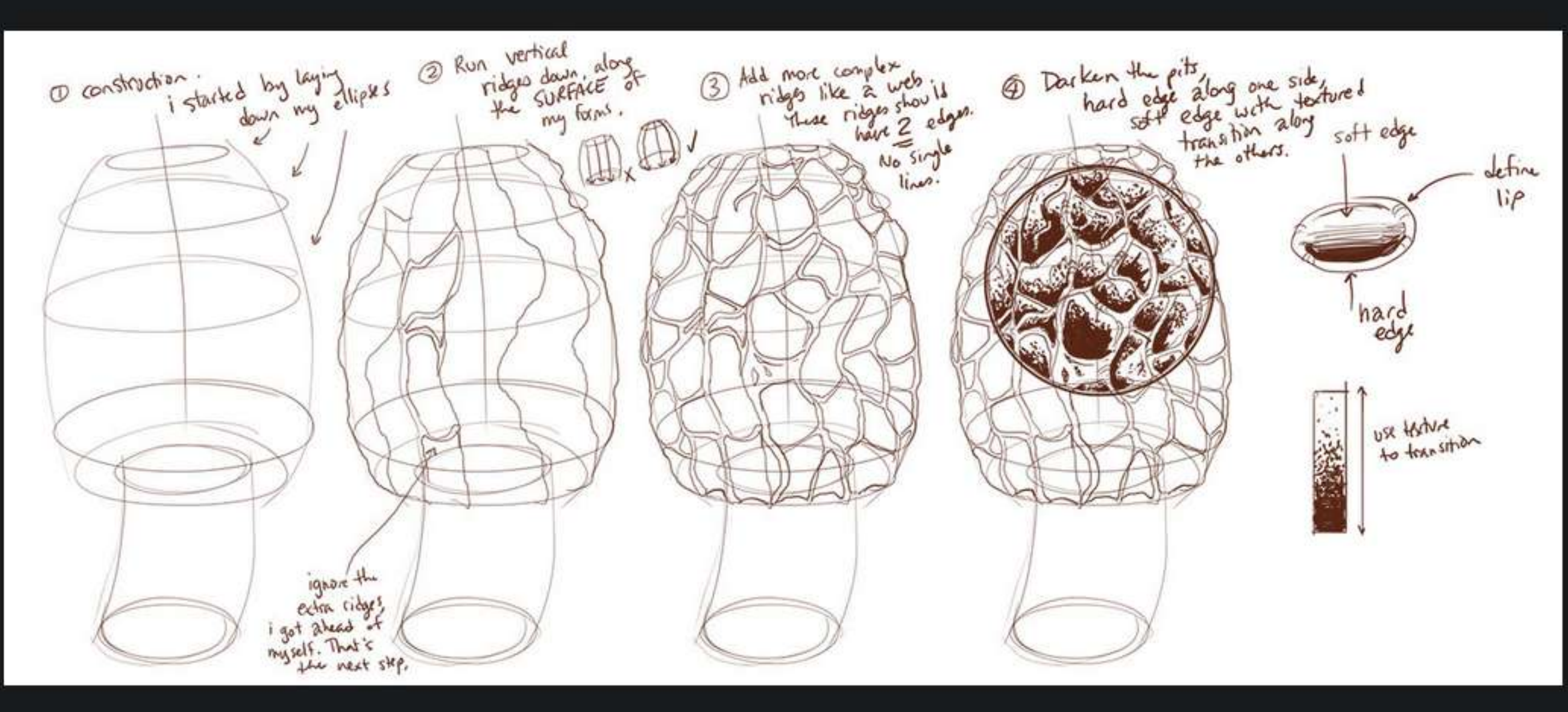
Before we get into anything too complicated, I did notice several strong, dominant valleys coming down along the length, so I decided to block these in first with a few simple lines, establishing how they flow downwards.



Next, there are a lot of smaller recesses between these major valleys, so I've outlined them gently. I haven't yet decided if I want to fill these in with black or leave them empty - that will be determined by where I want to concentrate my heavy darks, something I have not yet decided.



The rest is simply a matter of applying the principles covered in lesson 2. Observe your reference, identify *specific* elements present and transfer them one or two marks at a time before looking back at your reference to refresh your memory. Don't rely on your brain's ability to remember large amounts of information, because it *will* disappoint you. Instead, build a rhythm of looking at your reference, drawing briefly, then looking back again to study it once more.


① construction. i started by laying down my ellipses
ignore the extra ridges i got ahead of myself. That's the next step.
② Run vertical ridges down, along the SURFACE of my forms.
③ Add more complex ridges like a web. These ridges should have 2 edges. No single lines.
④ Darken the pits, hard edge along one side, soft edge with textured transition along the others.
soft edge
define lip
hard edge
use texture to transition

There are many kinds of mushrooms out there with all kinds of crazy structures. The bit between the cap and stem of this one was pretty simple in comparison to what you can find on the morel mushroom, as shown above.

<<< Daisy Demo

Video Only Demos >>>

Sakura Pigma Microns

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In terms of line weight, the sizes are pretty weird. 08 corresponds to 0.5mm, which is what I recommend for the drawabox lessons, whereas 05 corresponds to 0.45mm, which is pretty close and can also be used.

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Lesson 3: Applying Construction to Plants

Video Only Demos

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LISTEN WITH DRAWABOX

The demos listed here have no written counterpart, and are only available in video form.

Hibiscus Demo

This one focuses on what you may encounter when drawing flowers in general, especially the necessity of focusing on how the petals themselves flow through space.

Cactus Demo

Not all plants are going to have components that focus primarily on the flow of flat forms through space. Some have mass and solidity of their own, like cactuses and mushrooms, and are all perfectly valid topics to attempt when working through this lesson.

<<< Mushroom Demo

Pitcher Plant Demo >>>

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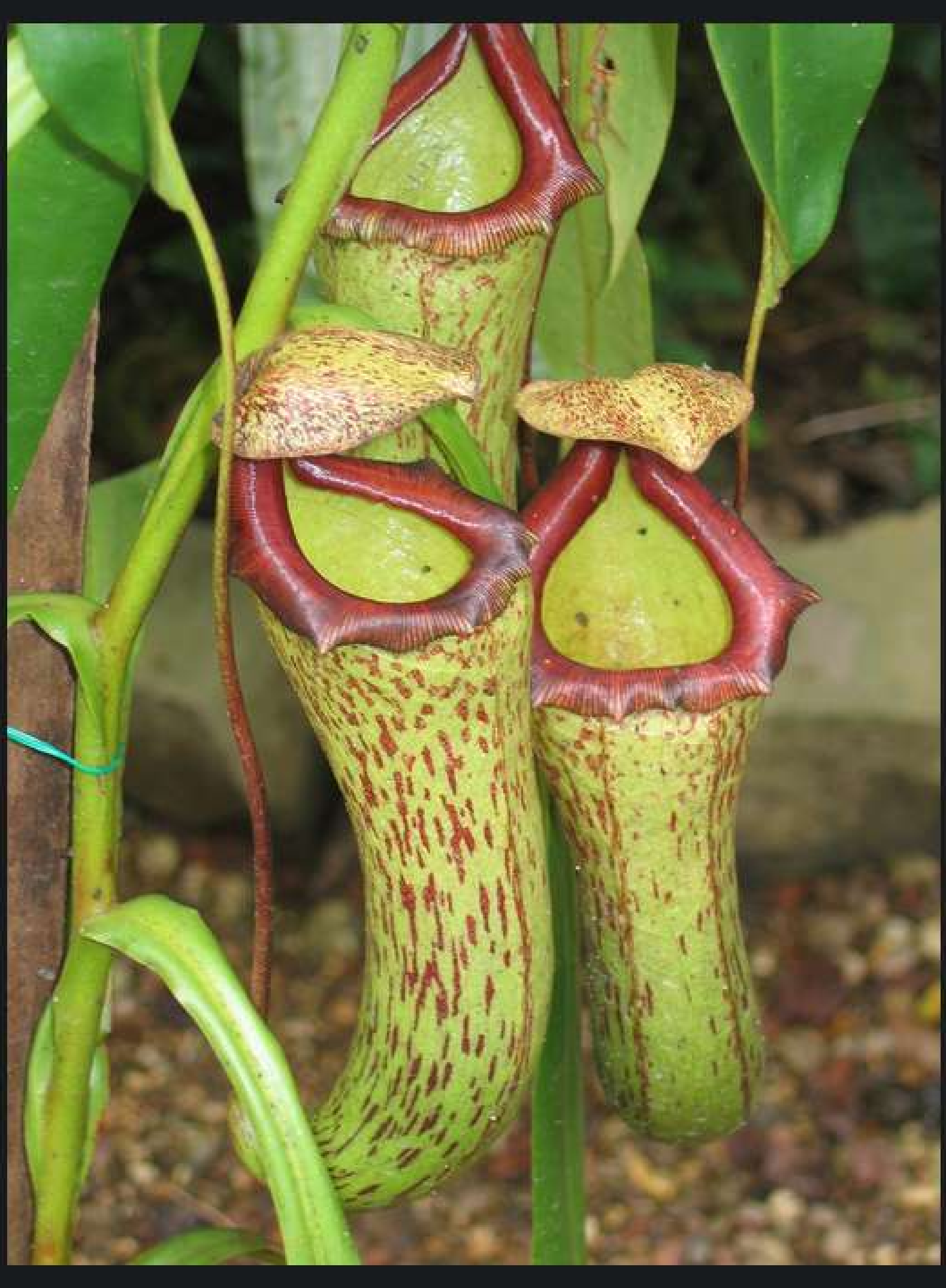
Demo video

When thinking about what kind of demos to do, I figured I'd spread them out over a few different kinds of plants you might see. This doesn't have a whole lot of leafy flat-ribbon type stuff going on, and instead is more closely related to organic forms.

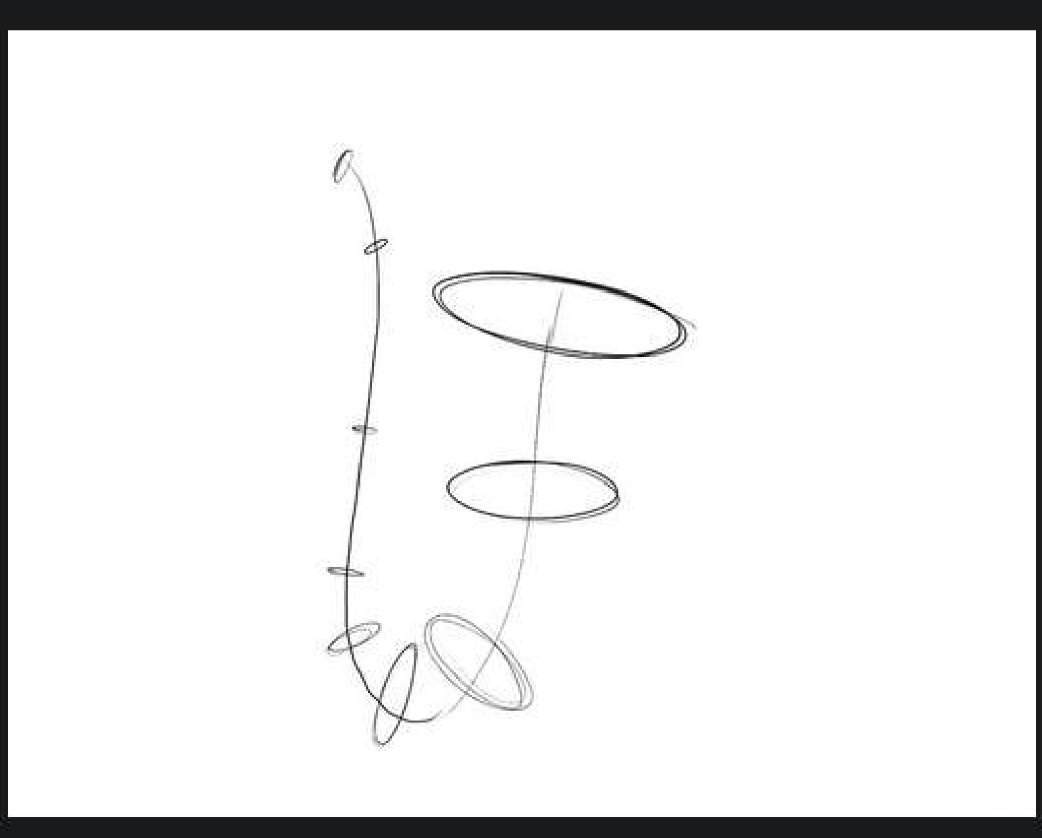
This recording has no accompanying audio commentary.

Reference



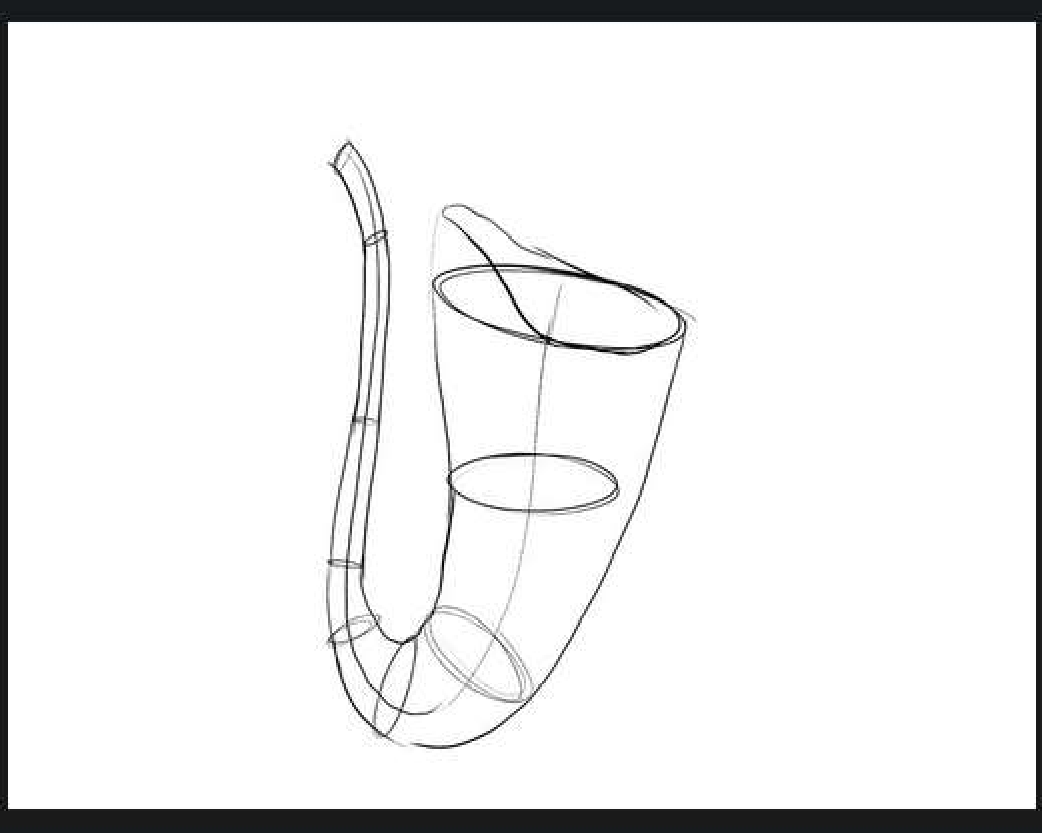
As with all of our constructional drawings, we will be working from reference. This image was found on Gardening Know How.

Step by step

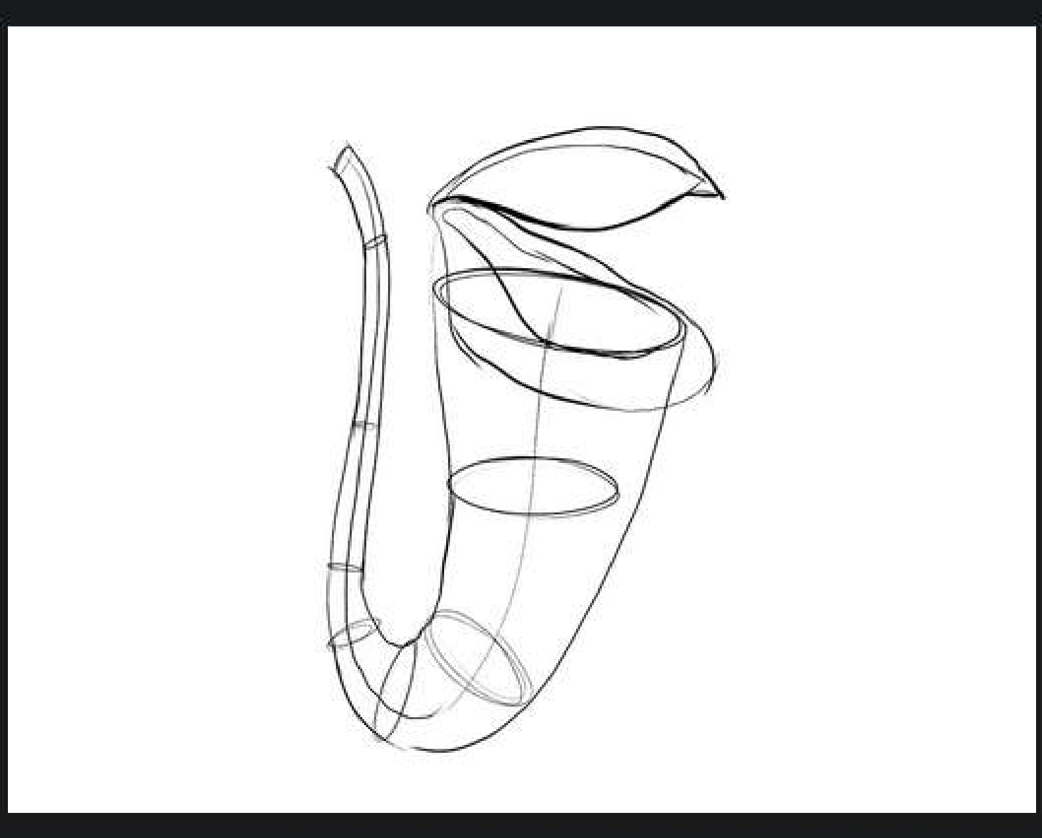


In lesson 2, we tackled constructing organic forms with no real limitations or targets. In this case, there's a particular flow that we want our form to follow. Just like how we set out the center line for our leaves, we do the same thing here. Then we follow it up with a few ellipses along the length to define how the form is going to expand or taper. It's actually a lot like building a ship - you lay out the ribs/supports before putting down the...

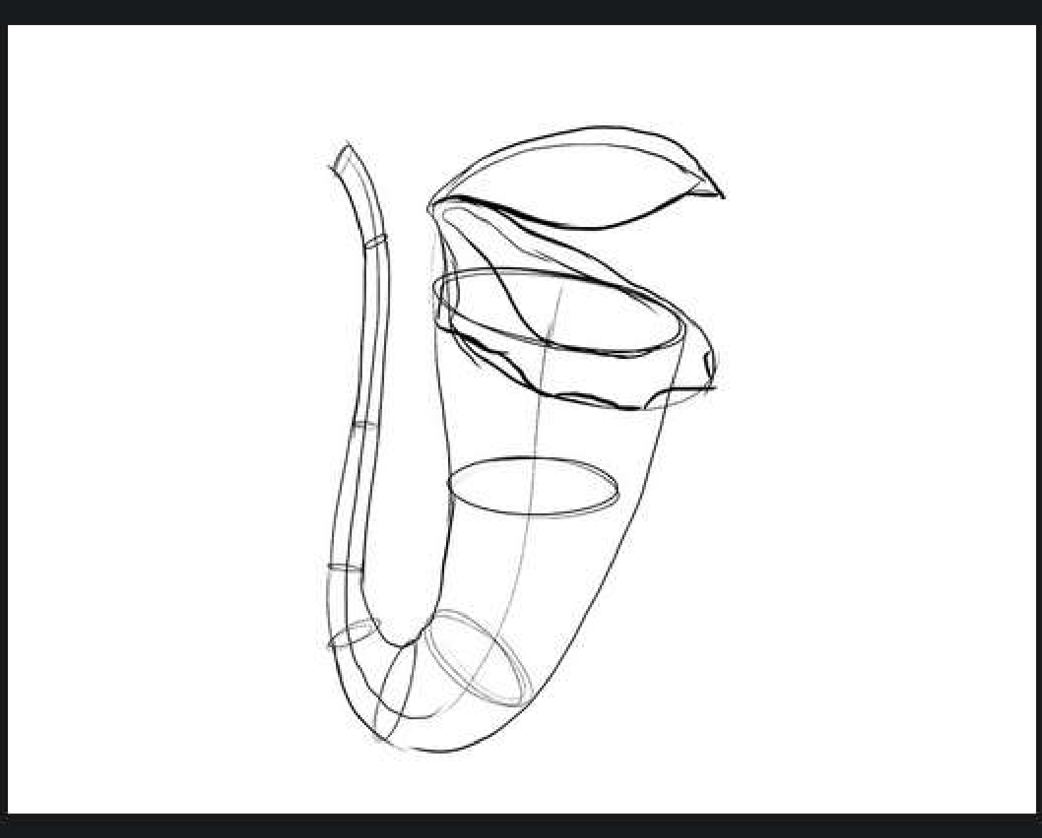
Alright, you got me. I know nothing about building ships, neither technique nor terminology. I'll stop that analogy right there.



With the supporting scaffolding set out, we build our form around these ellipses, and I've also extended the lip on the top to match my reference.. It can be a little tricky, but always remember to be confident with your linework. You'll make mistakes, you'll mess things up, but it doesn't matter. We're not here to make pretty pictures, we're here to learn how to draw.

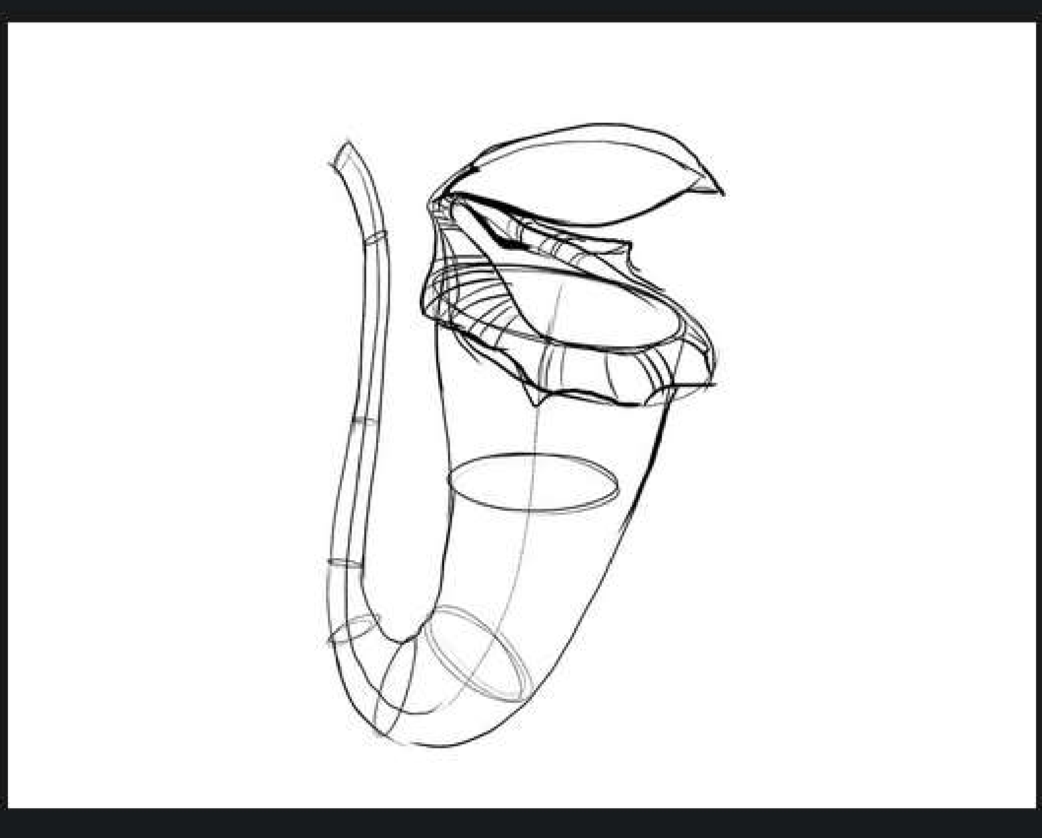


Looking at the mouth of this plant, there's two additional features - the leaf hanging over top, and the strange form curled along the rim. The form on the rim's got some shape to it, but we want to lay it in first before even considering that bit. So, we lay it in as simply as possible, capturing the fact that it's simply curled back. Always capture your details as simply as possible first, then refine them.



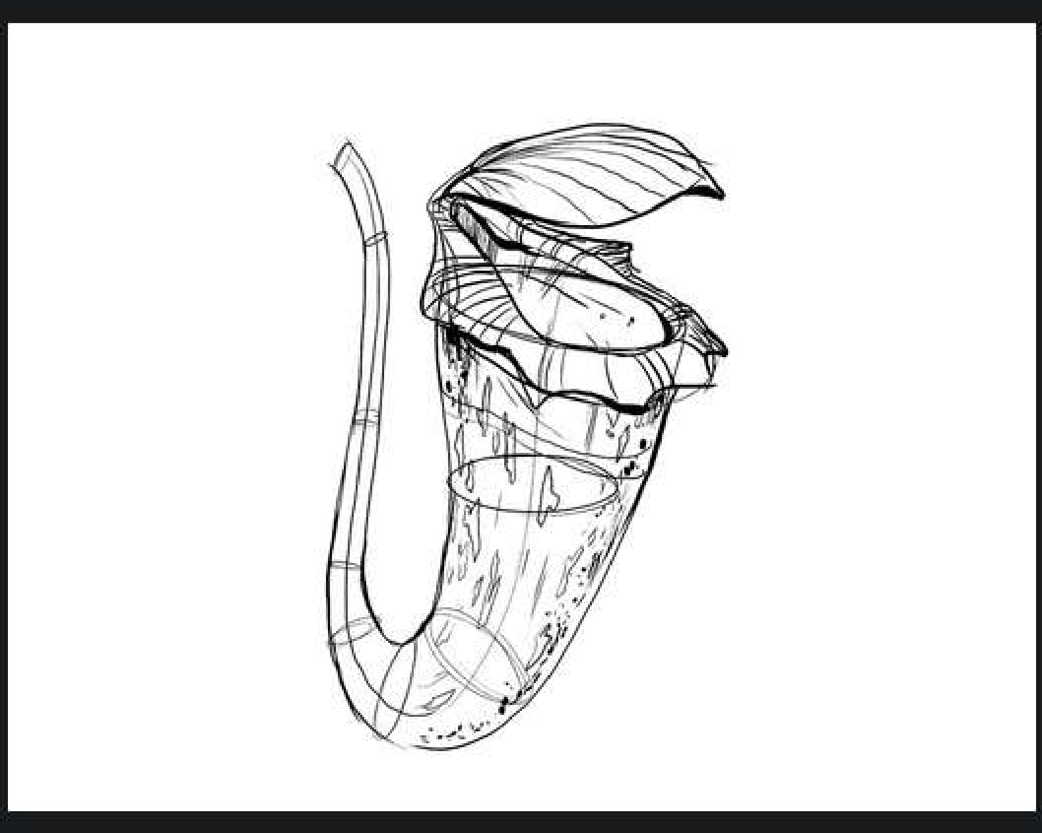
So, with our forms blocked out, we can start breaking them down. Keep in mind that our initial lay-in is not a suggestion. You adhere to it as closely as you can, even if you start to find that you've deviated here and there from your reference. Just go with it.

You made decisions in the previous steps, and those decisions cannot be unmade. As with the analogy I mentioned in the intro video, you've laid down the scaffolding, and now you're raising the building itself. You can tuck things in, or stick them out, but you can't work outside the bounds of your scaffolding, or everything will fall apart.



Looking at the reference image, you can see some pronounced ridges along that form that rests along the edge of the mouth. These are useful, as they're natural contour lines. Whenever these sorts of things occur, we want to take advantage of them in order to better describe how our surfaces twist, turn and deform through space.

You can think of natural contour lines as freebies - where you need to be careful about how and where you place your artificial ones (those that you add yourself that wouldn't be part of a pristine drawing, like the ellipses we used earlier in the construction), the natural ones are already supposed to be part of the final image.



And finally, detail. It's very easy to get caught up in detail, and it's very often that I see students half-ass prior steps, expecting to be able to recover in this phase. **It does not work like that**.

An undetailed construction can still be beautiful in its own right, but an awful construction covered in detail is going to look like a bulldog in makeup. No one wants to see that. Spend your time focusing on your construction. Details should be an afterthought. It would probably be a good idea to reserve details to the last half of your homework, so your first few drawings can be properly focused entirely on construction.

<<< Video Only Demos **Potato Plant Demo >>>**

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Lesson 3: Applying Construction to Plants

Potato Plant Demo

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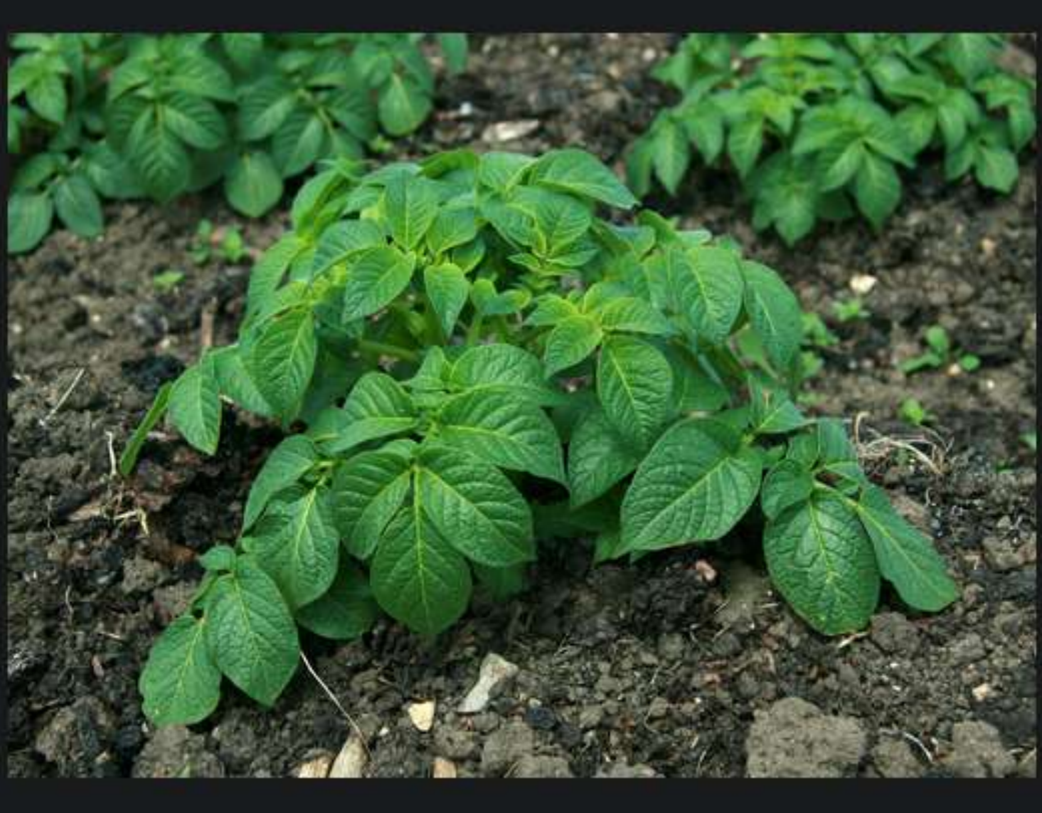
Demo video

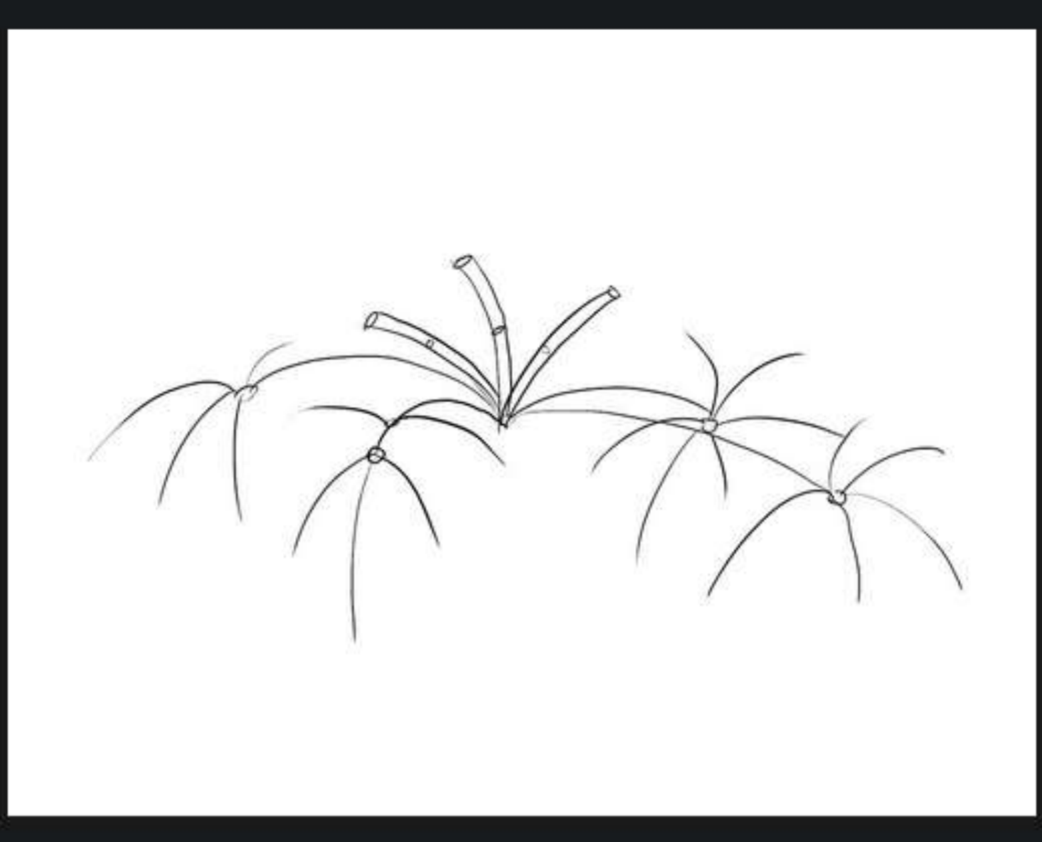
The second demo's going to focus more on leafy plants. We've gone over dealing with individual leaves, but drawing clusters of them is... well it's not so much difficult, as it is annoying, and I feel like it might be valuable to show you guys the process of it.

This recording has no accompanying audio commentary.



Reference

As with all of our constructional drawings, we will be working from reference. This image was found on Gardening Know How.

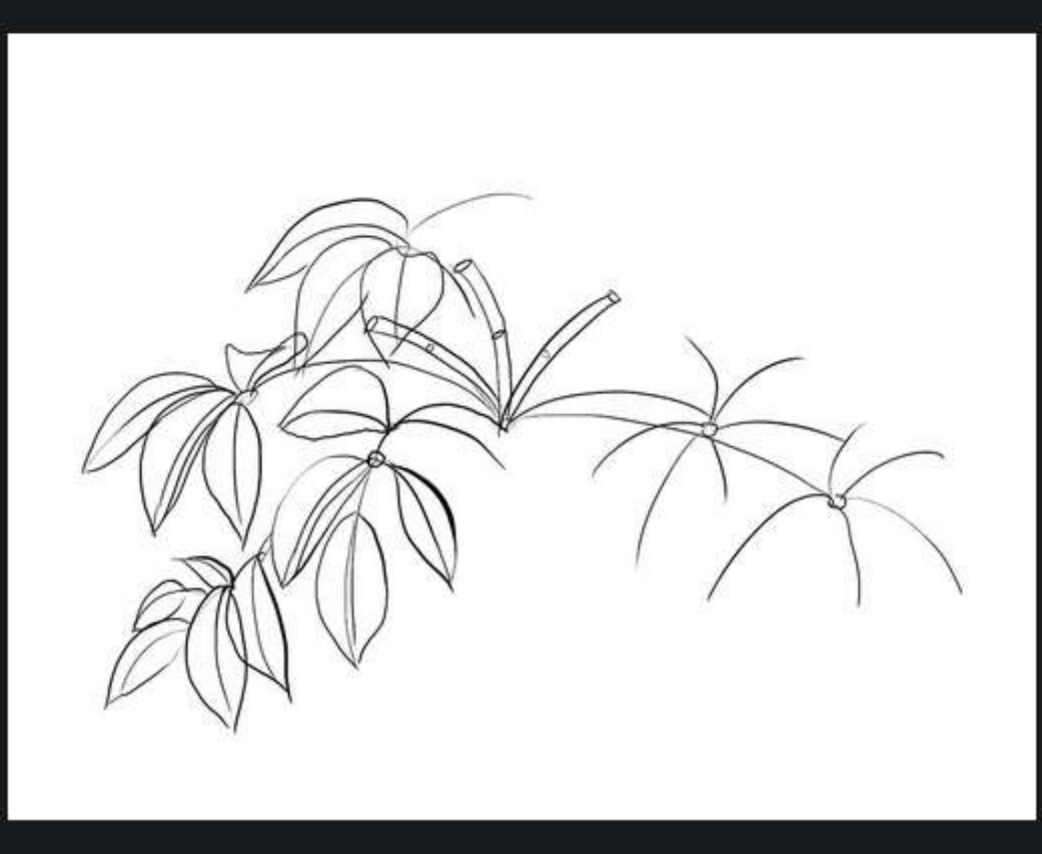


Step by step

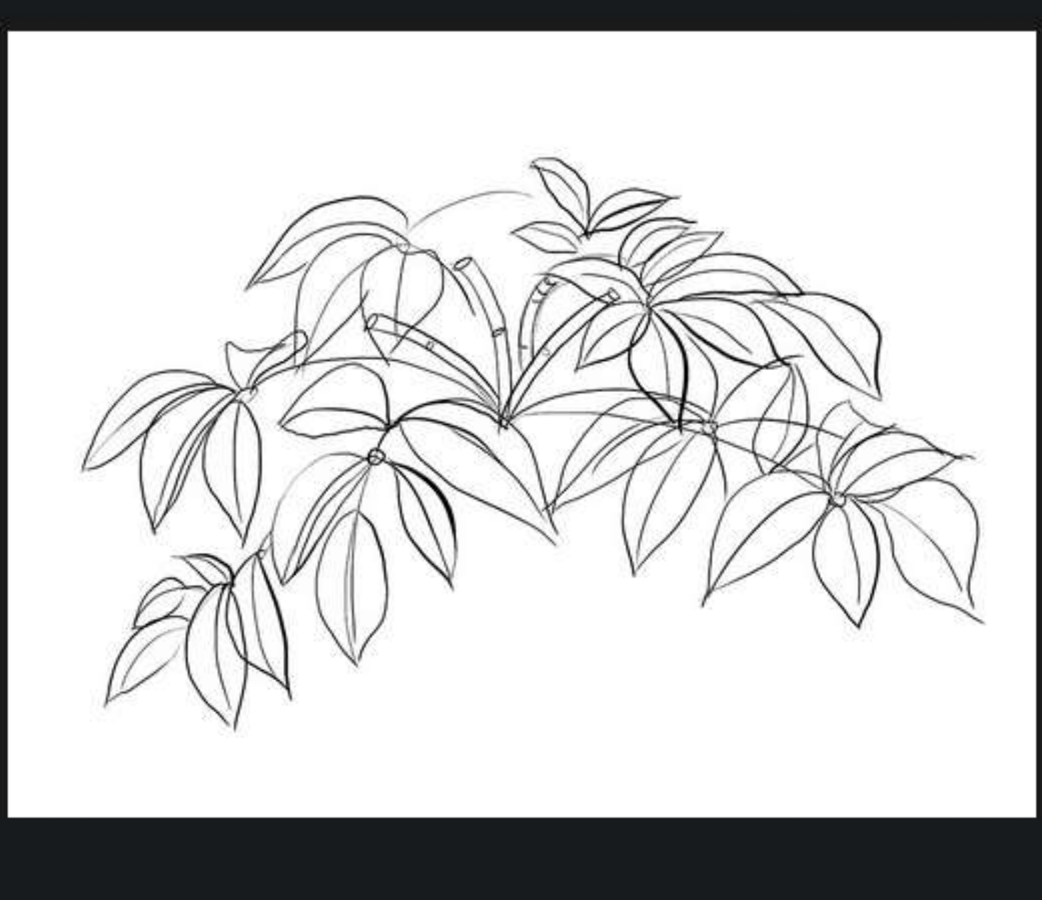
As always, the most important steps come first. Here we're figuring out just how these leaves are laid out. At first glance, one might think that it's just a pile of haphazard leaves, but that is virtually never the case. There's always some kind of rhythm, pattern or structure to how objects are arranged. Pure randomness tends to look awful to our eyes, and nature itself rarely lays things out that way, by virtue of the laws it follows.

If you look closely, you can see that there's a core point where the stems sprout from the dirt. Several stems come out from there, and they each go off away from the center. Then, each stem sprouts several branches, from which leaves grow. So, you can see in this image that I've laid out my drawing to match this principle. I'm not being super careful about matching the reference image - I'm more interested in matching and understanding its essence. I like to think of it as though I'm drawing a potato plant, not necessarily this potato plant.

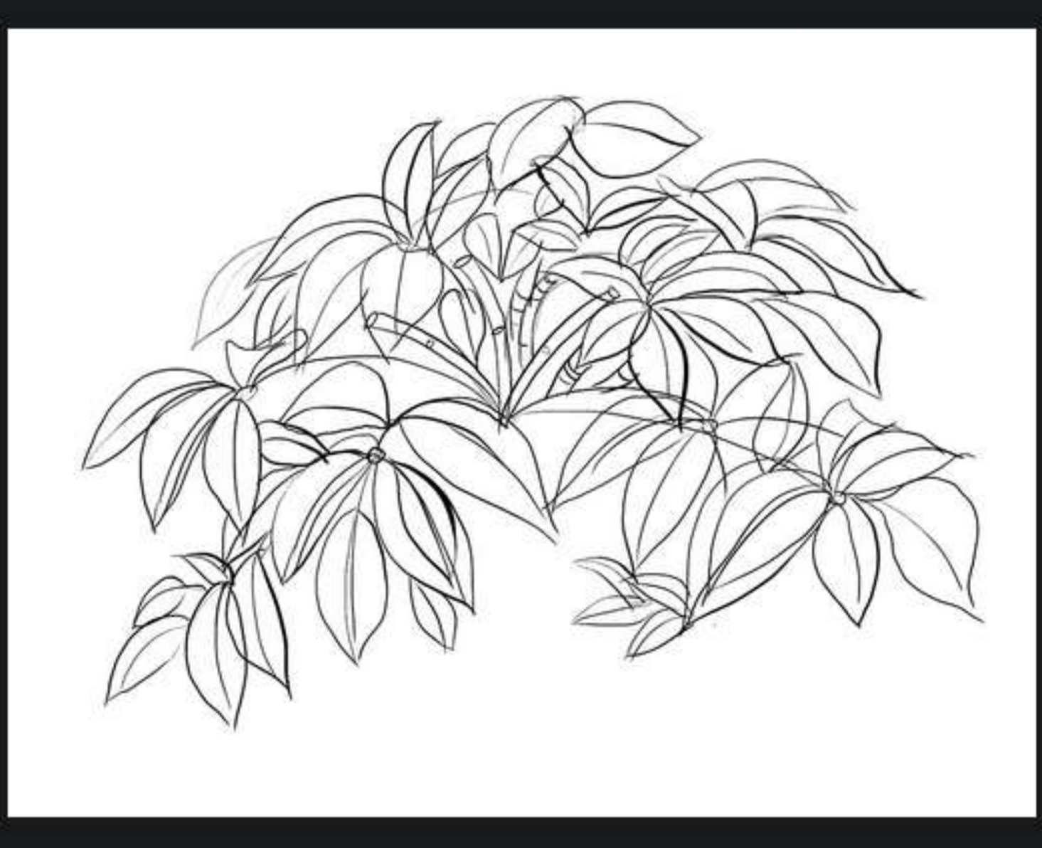
This also lets me focus more on maintaining the solidity and integrity of this drawing, rather than fussing over being a perfectionist and ruining everything in the process.



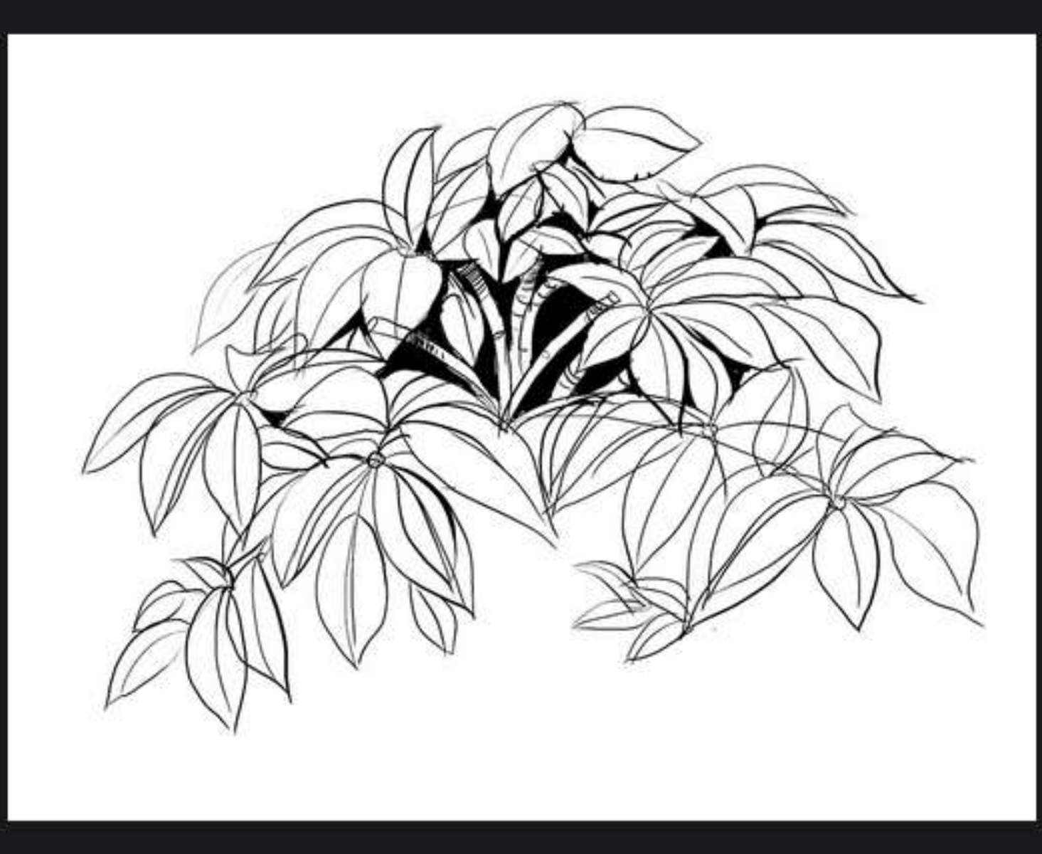
I also haven't gone into significant detail with the farther part of the plant. This is in part because I can't make out exactly what's going on there, and also because it's not my primary area of focus, so I'm fine with that being somewhat more loosely constructed.



Yeah, there's a lot of leaves to draw. Following our leaf construction method of center line, followed by *simple* edges neglecting any waviness or complexity, just focusing on how each leaf flows through space, we flesh out as many of the leaves as we can. It's going to get very tedious very quickly, but you've got to push through and try and maintain a solid level of quality for your leaves. If you find your quality dropping, put your pen down, stretch, take a break, whatever. Just don't allow the tedium of an exercise to decrease the quality of your work. Always put forward the best you can.

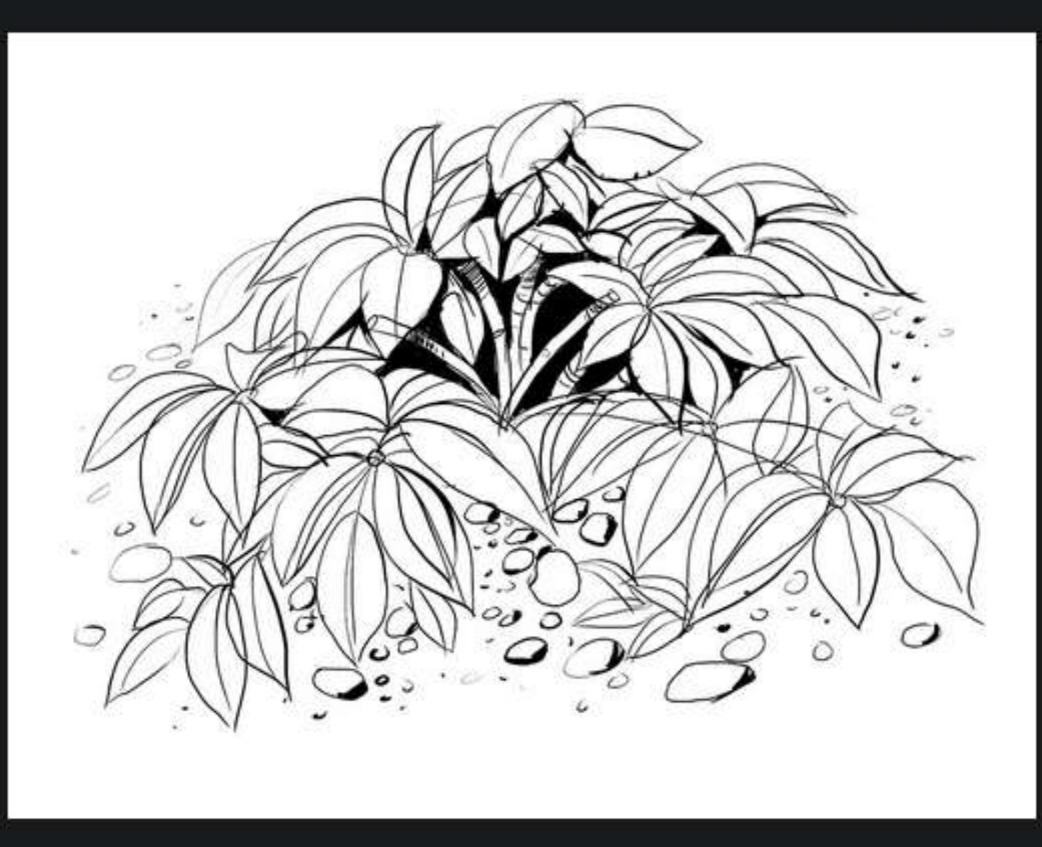


It's totally normal for your brain to insist that this is too hard, when it's actually not. It's like walking up a really big hill - it's not hard, it's just tiring. Given infinite breaks you can walk up any hill (barring starvation, injury, or *bears*).



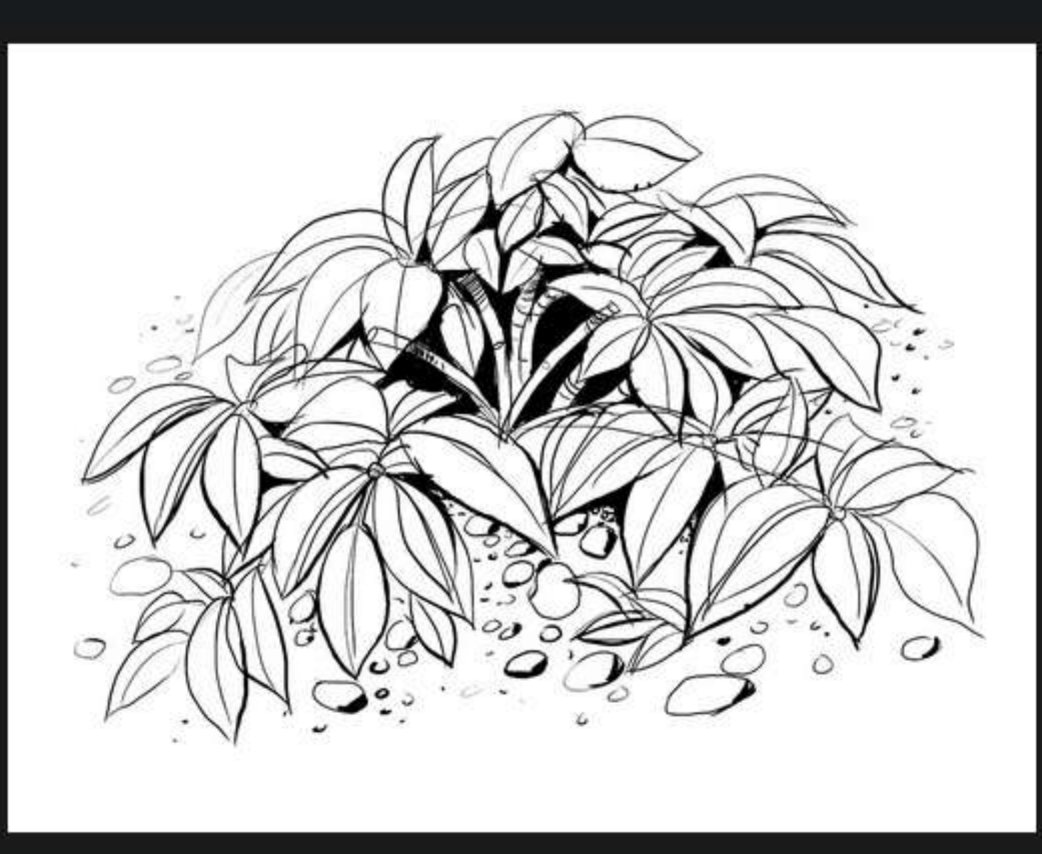
What I'm doing here is taking advantage of the shadows the leaves cast on the ground beneath them, and using flat black spaces to help clarify my drawing and organize my shapes. If you look at the previous step it's very difficult for your eye to focus on any one area - everything is equal, so they're all vying for your attention. Stare too long, and it's going to start to hurt.

Looking at this image however is going to start to feel a bit more clear. It's not quite there yet, but we'll continue to push that sort of organization and hierarchy in later steps. That's what you want to keep in mind - the idea of constructing a hierarchy. This is what should draw your eye first, then this, and so on. Every drawing you present to your audience should have embedded in it a road map for their eyes.

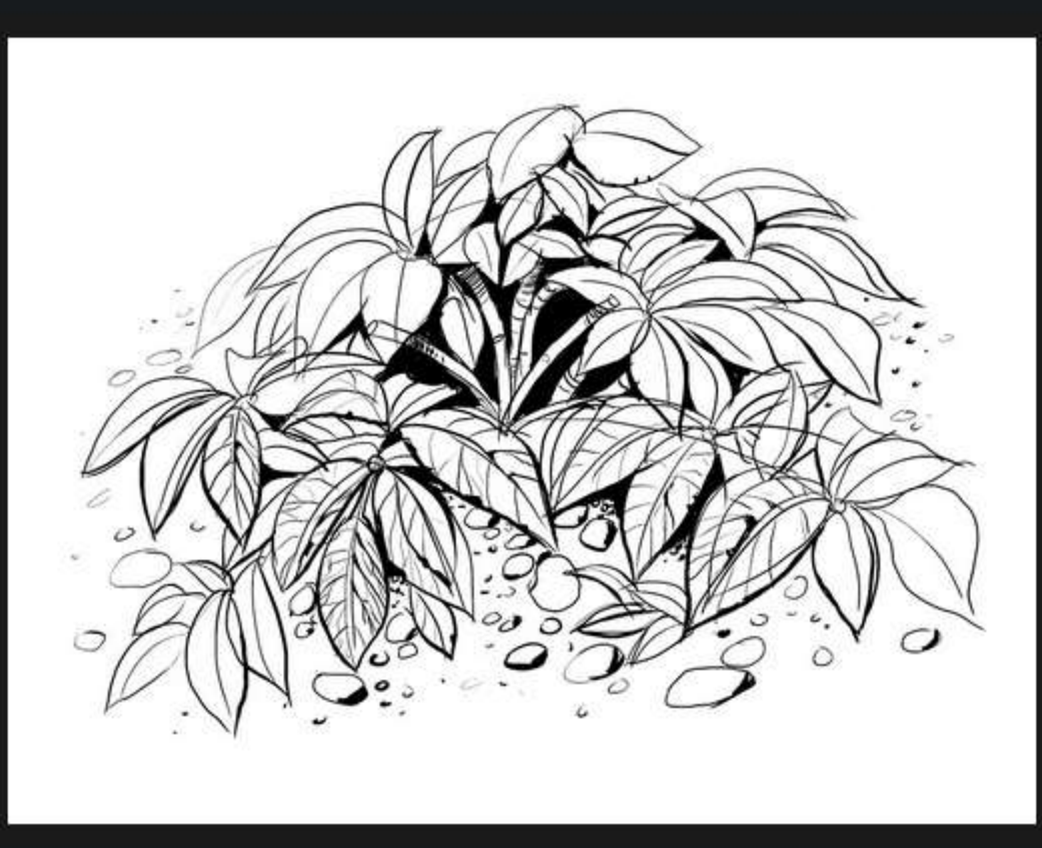


Now, as every drawing is going to be different and have different kinds of demands, this one in particular with its high angle shot could use a little bit of grounding and contextual information. The pile of leaves could just as well be floating in the air, or sprouting from the back of your head. There isn't any clear sense of how it relates to the surface it's coming out of, so adding these little pebbles and bits of dirt can really help to give the object some grounding. It doesn't have to be much, and you don't have to worry about applying the constructional method to every little bit. Even flat shapes can accomplish a lot in terms of lightly suggesting the presence of certain textures.

In fact, there are a lot of times where you would benefit significantly from using flat shapes instead of constructing solid, believable ones. One such situation is when they are not a part of your primary area of focus. Flat, flimsy shapes are naturally going to demand less attention from the viewer, so rather than presenting competition, they recede into the background and happily accept their supporting role.



Previously we used solid black fills to break up and organize our shapes - another approach with perhaps a lighter touch is to leverage line weight. If you've read over the 250 Box Challenge notes, you'll have come across how line weight can be used to clarify how different objects overlap, and establish one as dominant and the other as subordinate. That's what we're doing where - by adding more weight to the silhouettes of the leaves, we're pushing the ground detail back.



And once again, detail. Being that I just drew a bazillion leaves, I'm not terribly interested in going to town on this (not that I ever do). So, I splash on a few minor details to a particular area I wish to define as my focal area. It really is just a game of relativity. If nothing else has much going on, then even a little bit more detail is going to make a particular area stand out. There's rarely any need to go crazy with detail or texture on something.

<<< Pitcher Plant Demo

Informal Demos >>>

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These are my favourite sketchbooks, hands down. Move aside Moleskine, you overpriced gimmick. These sketchbooks are made by entertainment industry professionals down in Los Angeles, with concept artists in mind. They have a wide variety of sketchbooks, such as toned sketchbooks that let you work both towards light and towards dark values, as well as books where every second sheet is a semitransparent vellum.

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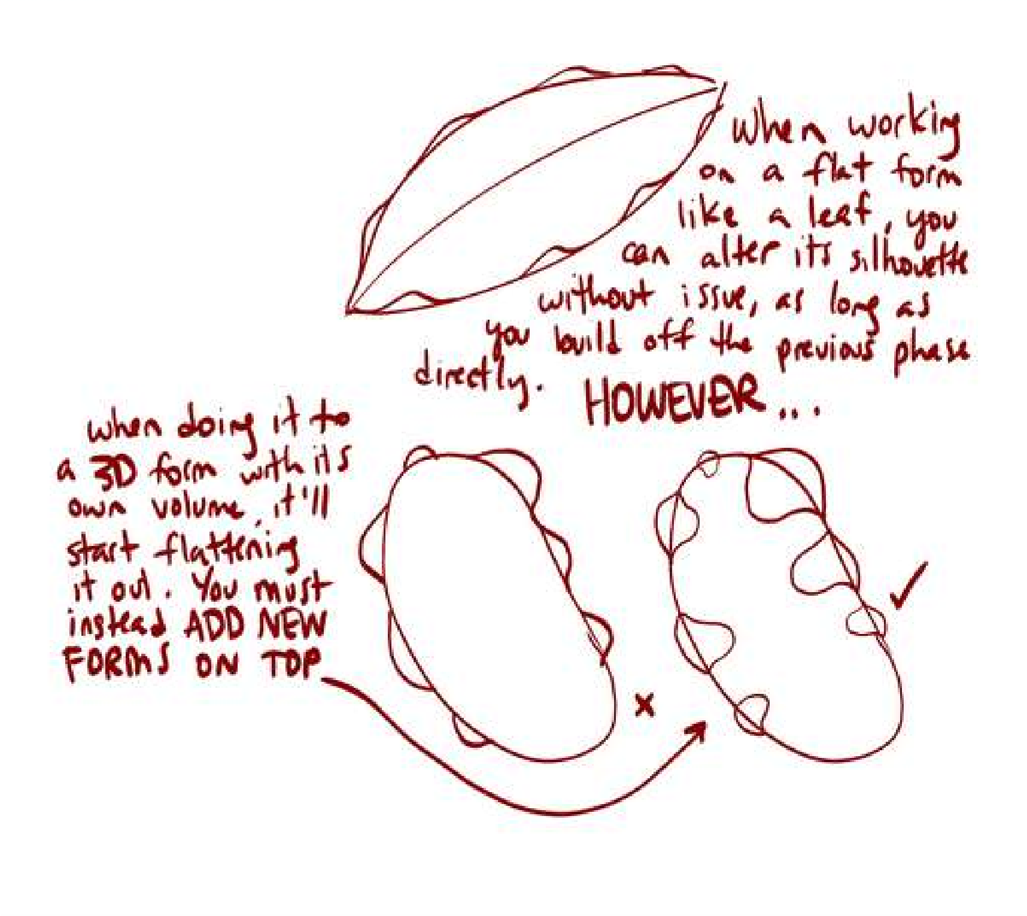
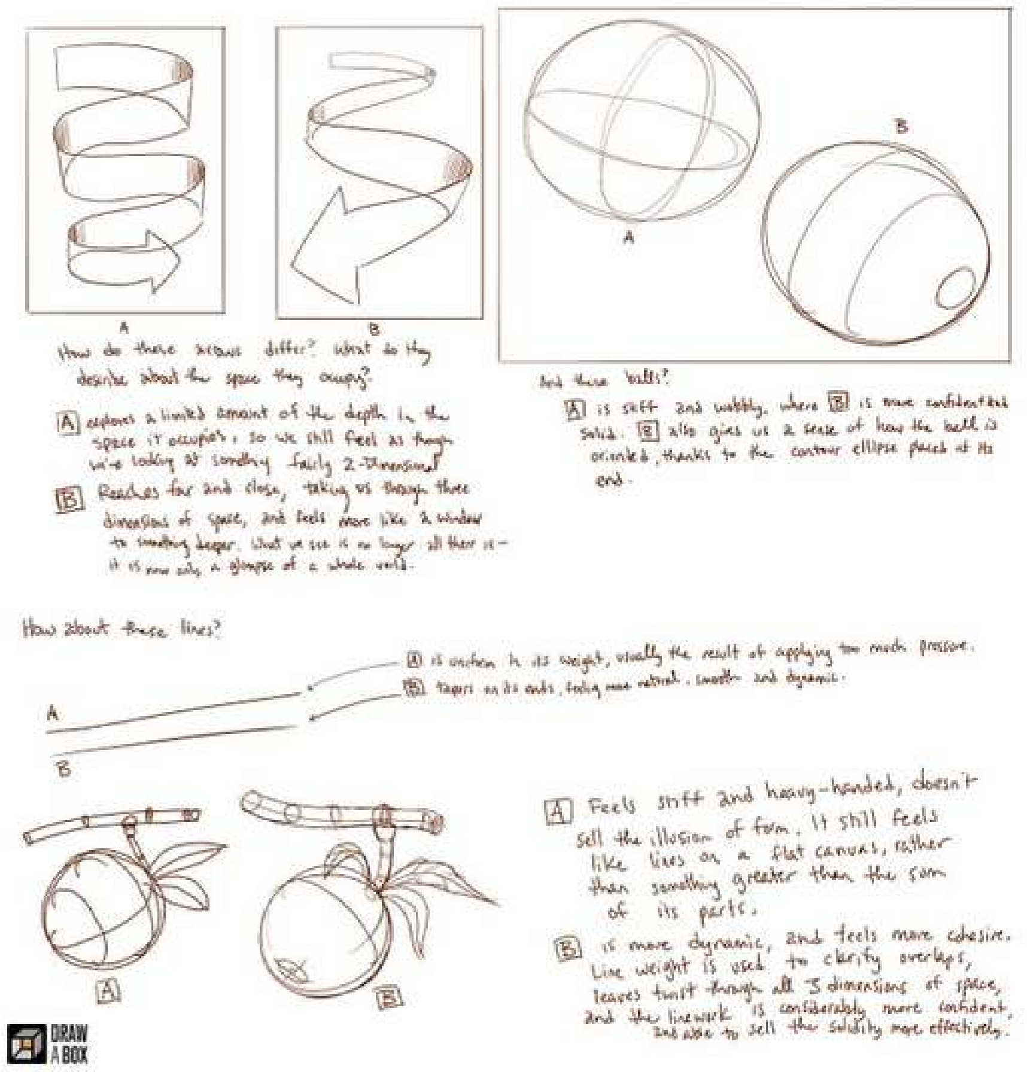

When working on a flat form like a leaf, you can alter its silhouette without issue, as long as you build off the previous phase directly. HOWEVER...
when doing it to a 3D form with its own volume, it'll start flattening it out. You must instead ADD NEW FORMS ON TOP
×
✓

Building upon forms that aren't already flat

This is something we look at more in the next lesson, but with certain structures - like cacti and some mushrooms - you may find yourself wanting to build more complexity on top of structures that are already 3D and voluminous, rather than the flat leaves and petals we introduced at the beginning of this lesson.

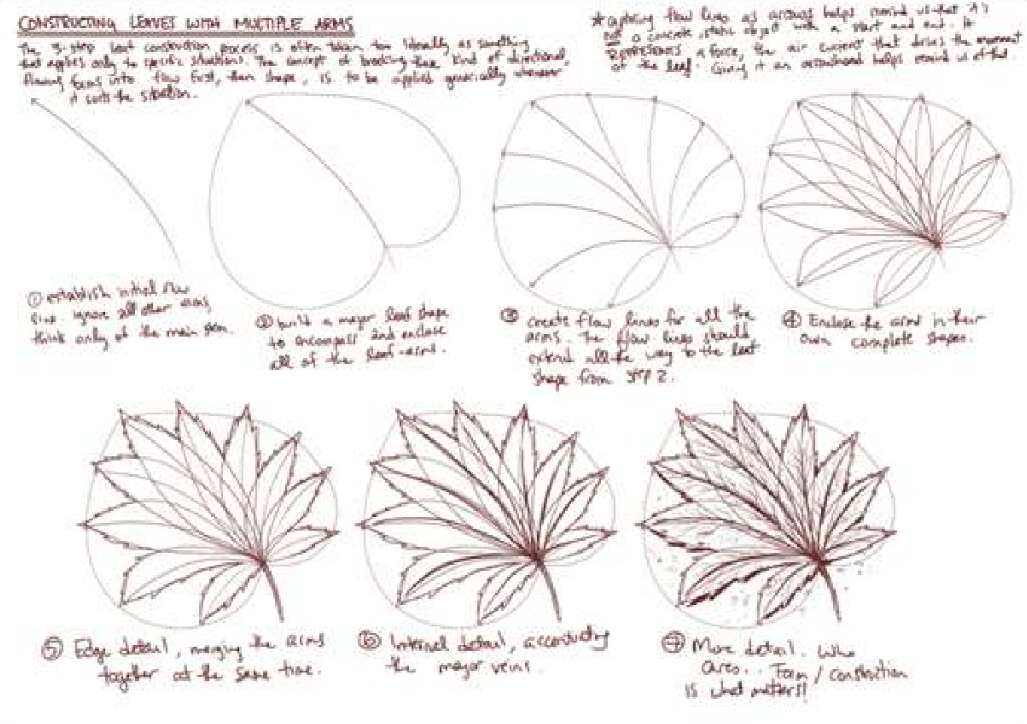
Unfortunately, using the same technique of altering the silhouette of that structure doesn't work. Instead, we have to build up new, complete forms onto the existing structure, making sure everything continues to read as three dimensional.


A
B
A
B
How do these arrows differ? What do they

Common pitfalls

Here you'll find some notes on issues I frequently see from students once you've broken free of the first two lessons. The bit about lines and the tendency to draw them with no real variation or liveliness to them is an especially common one. Remember that a line drawn confidently will always have a little bit of tapering where it touches down and where it lifts off the page.

If you're having trouble reading the handwriting due to the unfortunately small scale of the image, here's a transcription of it: https://pastebin.com/T9FAnStH

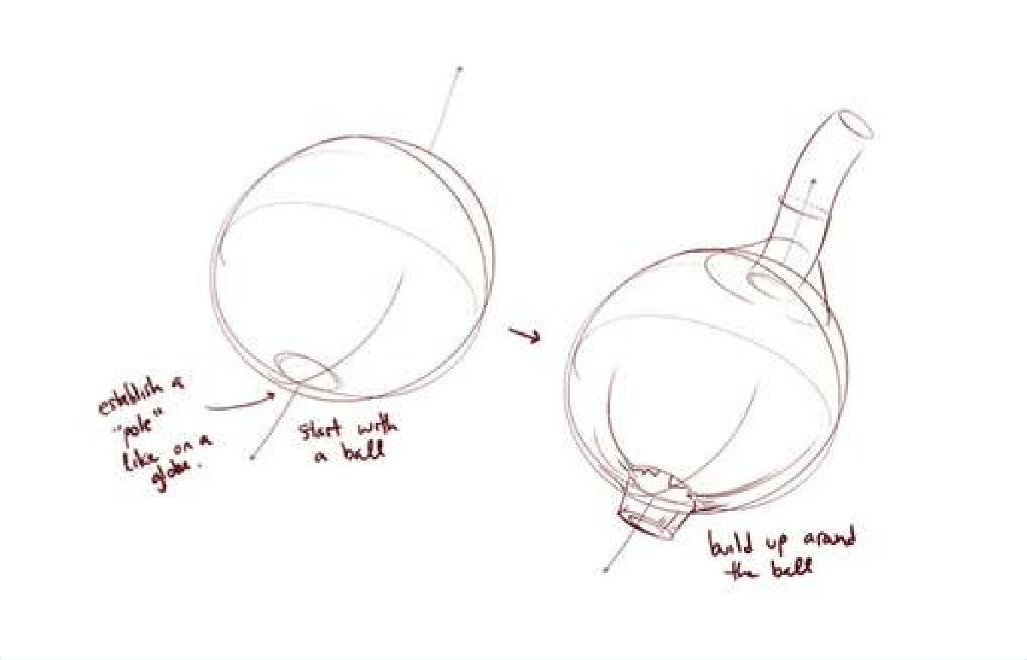

⑤ Edge detail, merging the arms together at the same time.
⑥ Internal detail, accentuating the major veins.
⑦ More detail. Who cares. Form / construction is what matters!!

Complex leaf structures

All too often I have students who look at the leaf construction method and think, "this is for leaves, and therefore all leaves are inevitably constructed with these exact steps in this exact order".

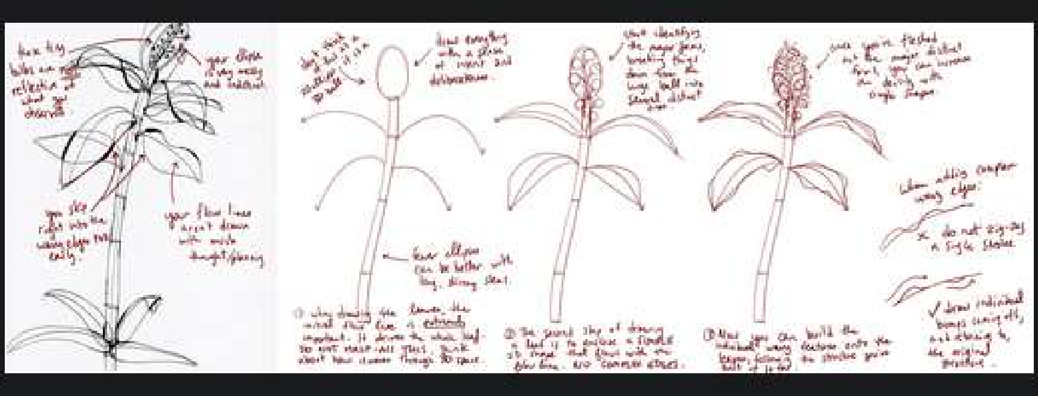
Instead, think about what the steps are meant to achieve, and consider that a tool in your toolbox for approaching anything similar to a leaf. Sometimes a leaf is composed of multiple smaller leaves - so consider applying the technique to each smaller element, then merging them.

If you're having trouble reading the handwriting due to the unfortunately small scale of the image, here's a transcription of it: https://pastebin.com/niMEJiUD


establish a "pole" like on a globe.
start with a ball
build up around the ball

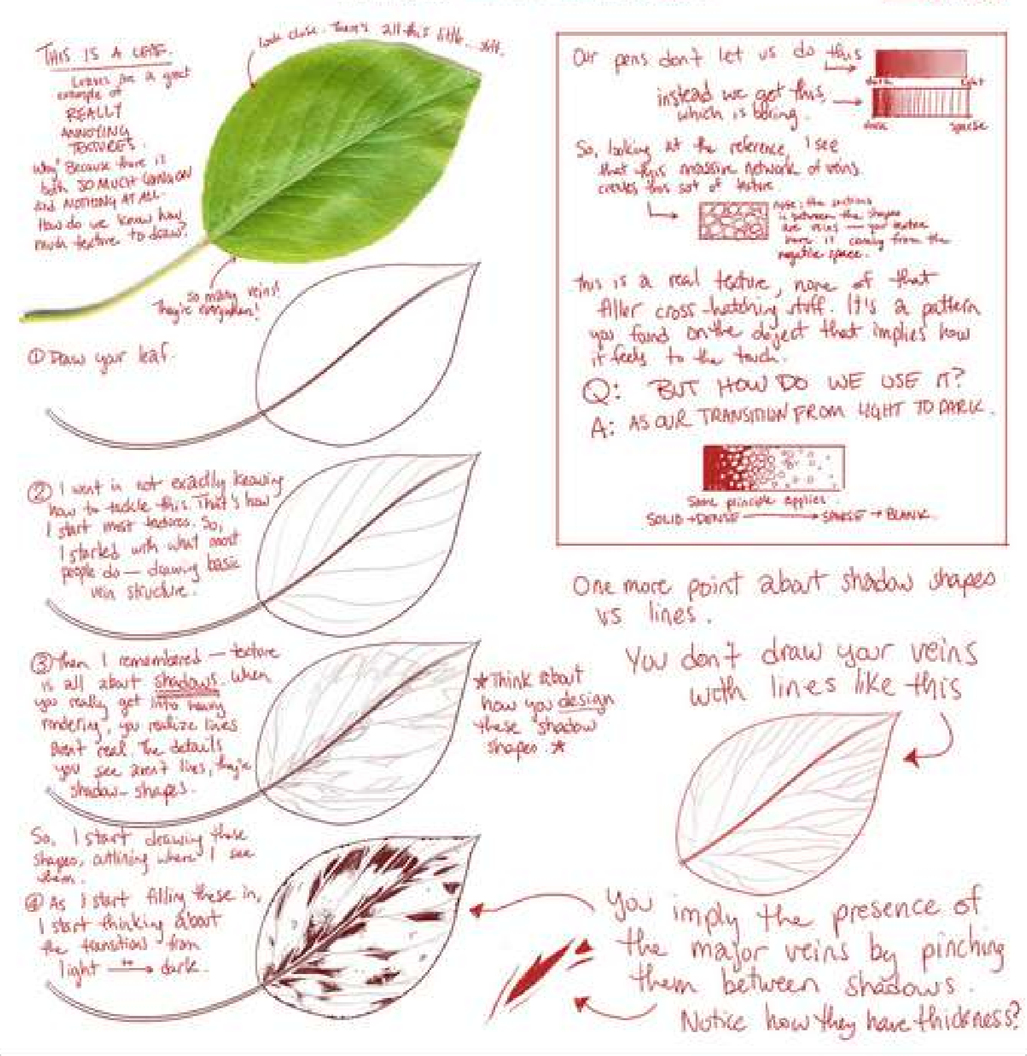
Poles

Poles - like what you'll find on the top and bottom of a globe - are extremely useful when it comes to taking a circle and making it feel like a sphere. They are essentially contour ellipses, but the key point here is that the whole thing is visible and does not go onto the opposite side of the sphere, since it is facing us.



Full plant construction

A simple demo of how I would have tackled the plant this student attempted. Notice how I draw the individual flow lines for the leaves with little arrow heads to really accentuate how they flow through space.


FUN WITH TEXTURE
HERE'S A SECRET — IT'S NOT FUN. LIKE, AT ALL.
DRAW A BOX
THIS IS A LEAF.
Leaves are a great example of REALLY ANNOYING TEXTURES.
Why? Because there is both SO MUCH GOING ON AND NOTHING AT ALL.
How do we know how much texture to draw?
Look close. There's all this little... stuff.
So many veins! They're everywhere!
① Draw your leaf.
② I went in not exactly knowing how to tackle this. That's how I start most textures. So, I started with what most people do — drawing basic vein structure.
③ Then I remembered — texture is all about shadows. When you really get into heavy rendering, you realize lines aren't real. The details you see aren't lines, they're shadow shapes.
So, I start drawing those shapes, outlining where I see them.
④ As I start filling these in, I start thinking about the transition from light → dark.
★Think about how you design these shadow shapes.★
Our pens don't let us do this
instead we get this which is boring.
So, looking at the reference, I see that this massive network of veins creates this sort of texture
this is a real texture, none of that filler cross-hatching stuff. It's a pattern you found on the object that implies how it feels to the touch.
Q: BUT HOW DO WE USE IT?
A: AS OUR TRANSITION FROM LIGHT TO DARK.
Same principle applies
SOLID → DENSE → SPARSE → BLANK
One more point about shadow shapes vs lines.
You don't draw your veins with lines like this
You imply the presence of the major veins by pinching them between shadows.
Notice how they have thickness?

Leaf texture

I wouldn't recommend worrying about texture too much, but when you look at it, it's not just a few lines implying veins - there's a lot going on if you look really closely.

<<< Potato Plant Demo

Applying Construction to Insects and Arachnids >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Sakura Pigma Microns

A lot of my students use these. The last time I used them was when I was in high school, and at the time I felt that they dried out pretty quickly, though I may have simply been mishandling them. As with all pens, make sure you're capping them when they're not in use, and try not to apply too much pressure. You really only need to be touching the page, not mashing your pen into it.

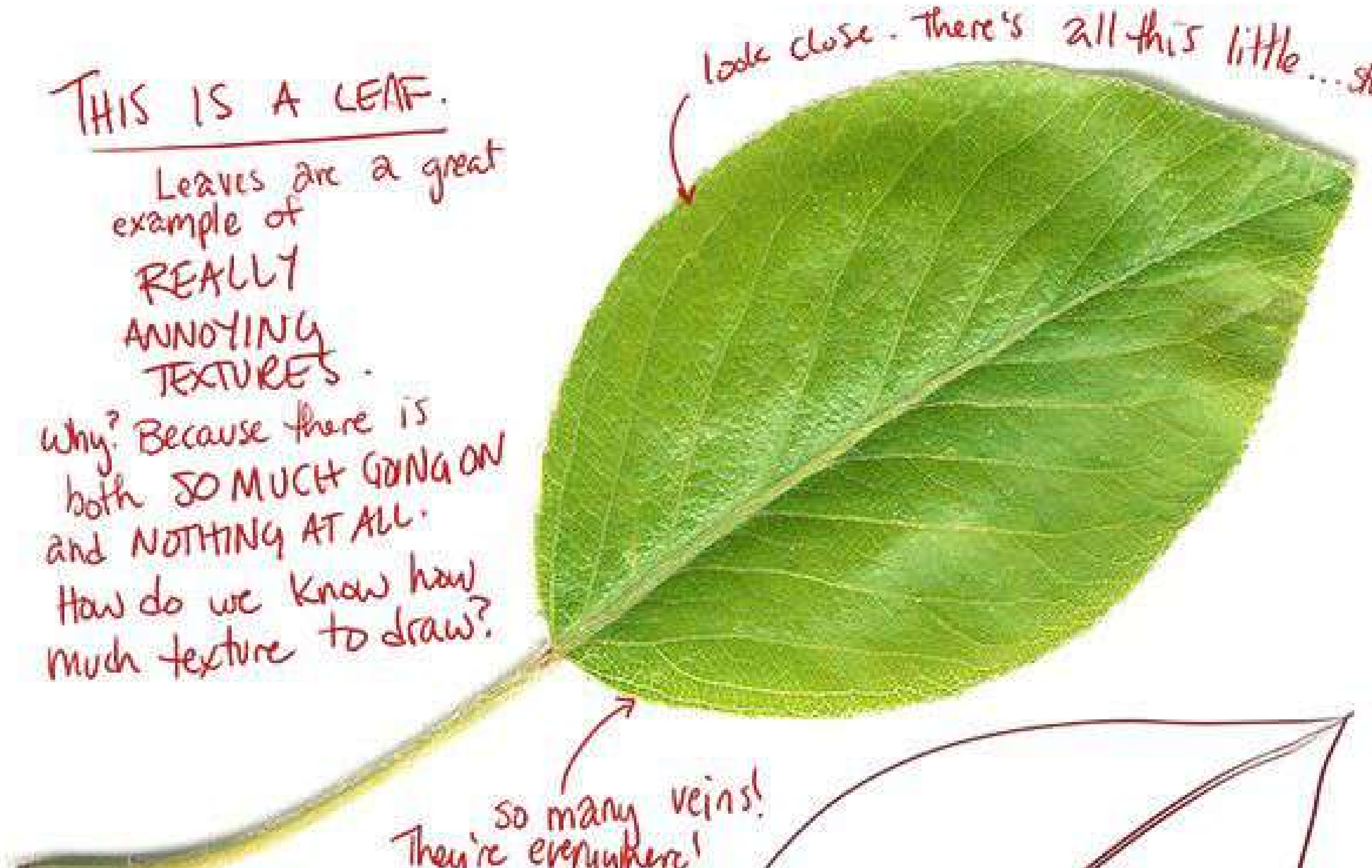
In terms of line weight, the sizes are pretty weird. 08 corresponds to 0.5mm, which is what I recommend for the drawabox lessons, whereas 05 corresponds to 0.45mm, which is pretty close and can also be used.

FUN WITH TEXTURE

HERE'S A SECRET — IT'S NOT FUN. LIKE, AT ALL.

THIS IS A LEAF.

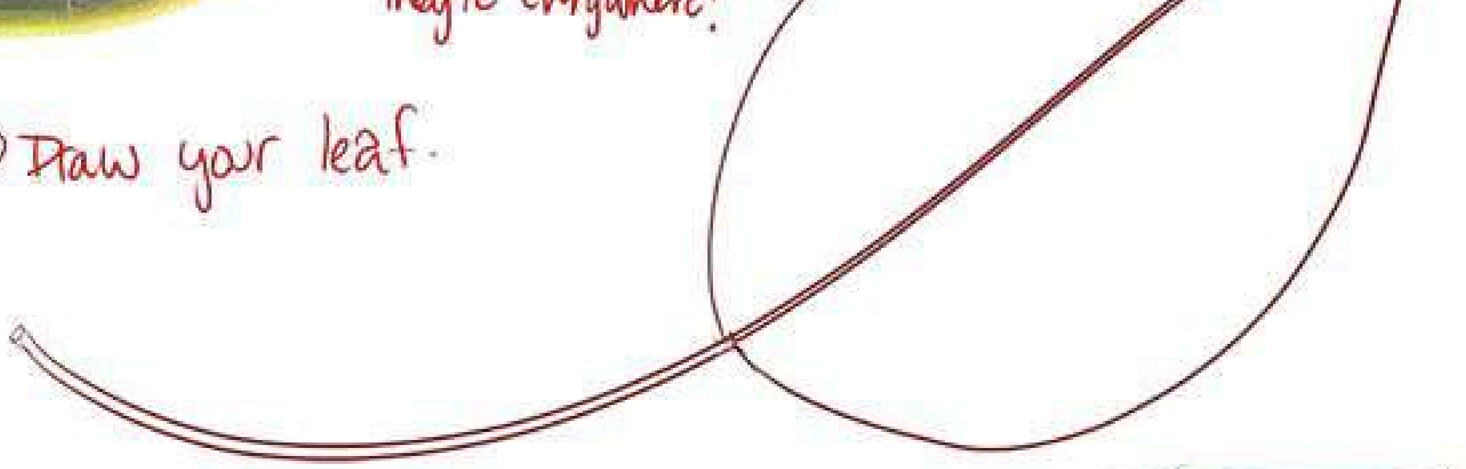
Leaves are a great example of REALLY ANNOYING TEXTURES. Why? Because there is both SO MUCH GOING ON and NOTHING AT ALL. How do we know how much texture to draw?



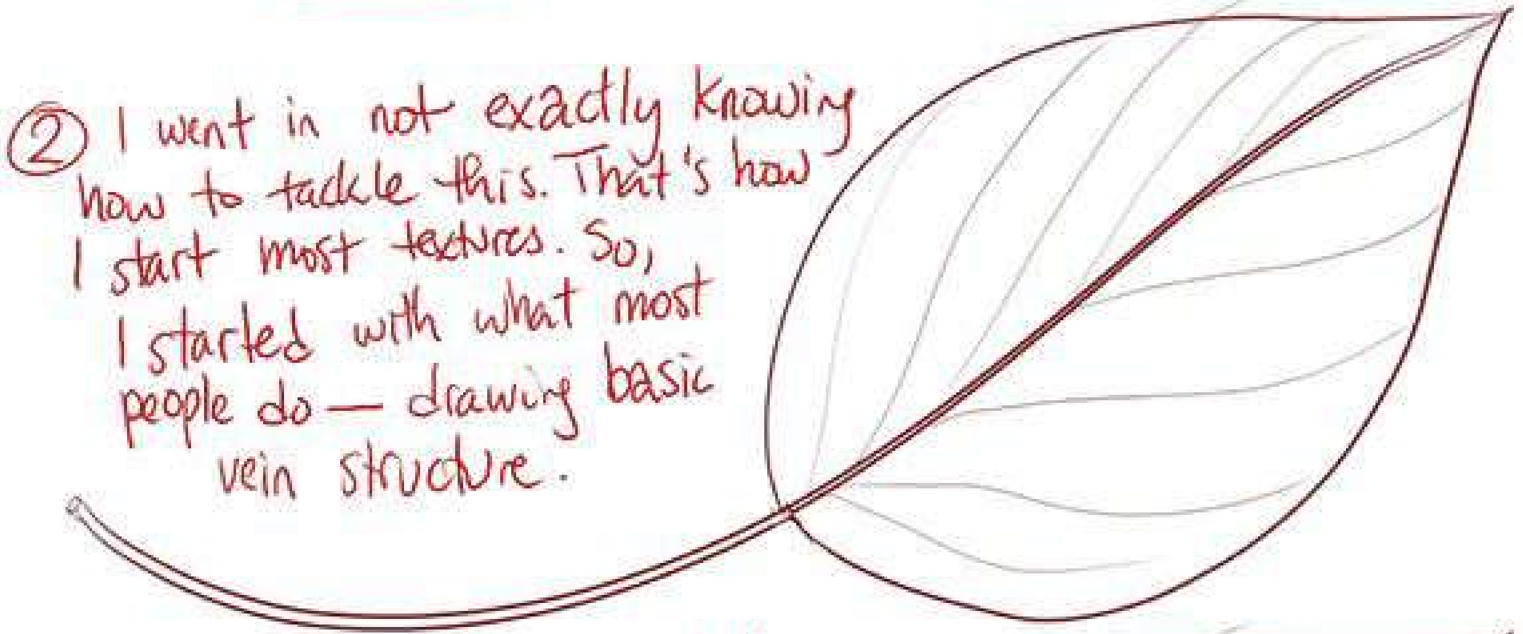
look close. There's all this little... stuff.

So many veins! They're everywhere!

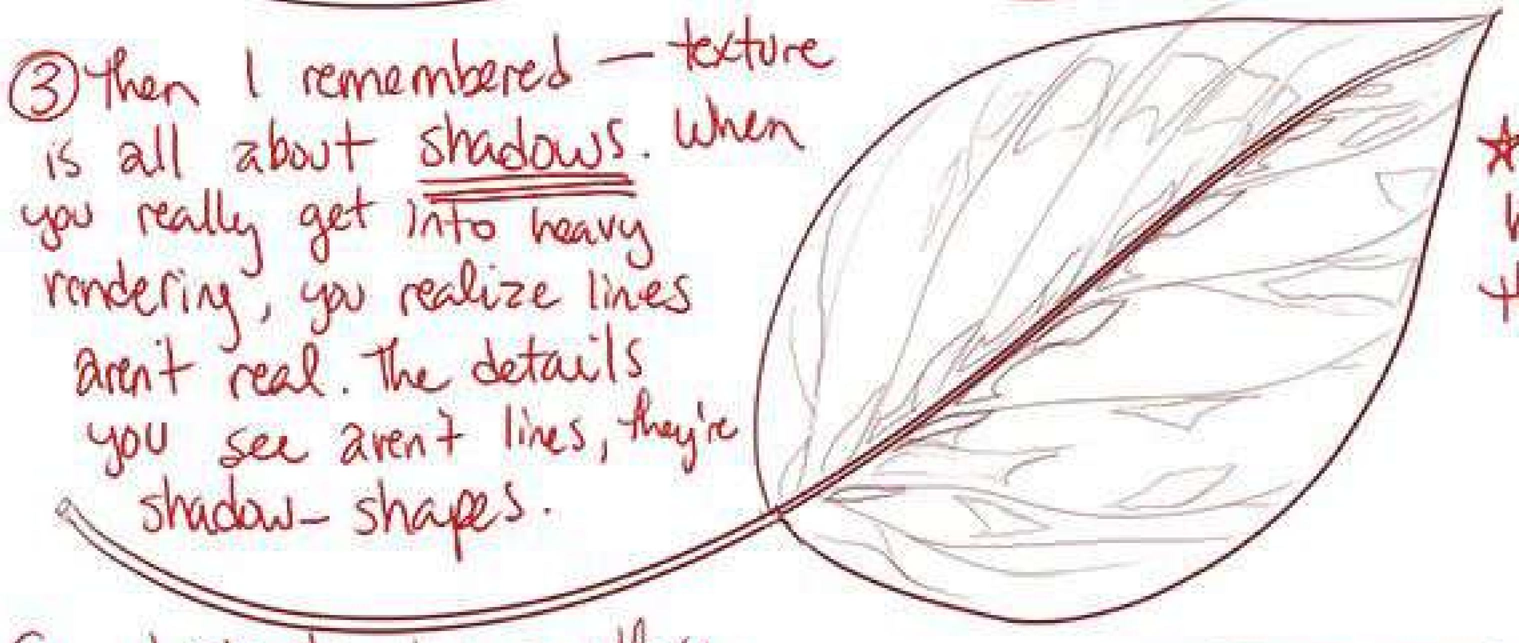
① Draw your leaf.



② I went in not exactly knowing how to tackle this. That's how I start most textures. So, I started with what most people do — drawing basic vein structure.



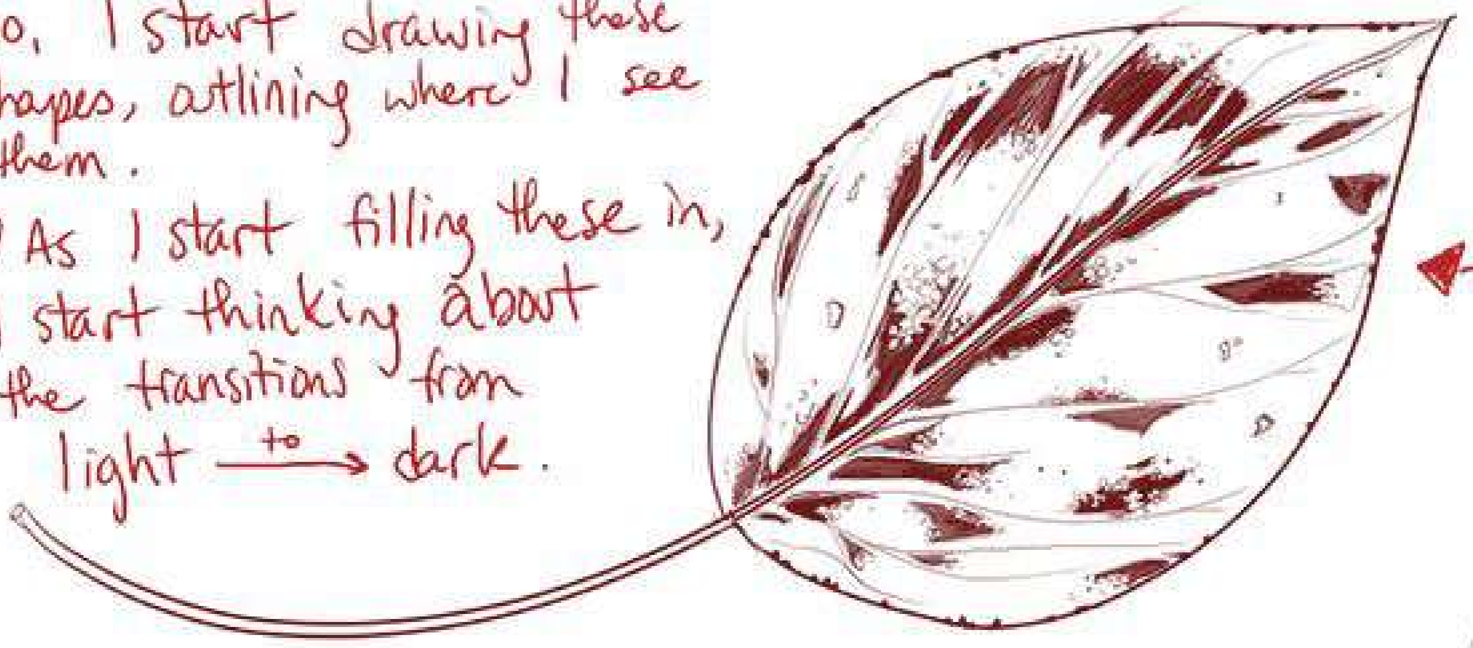
③ Then I remembered — texture is all about shadows. When you really get into heavy rendering, you realize lines aren't real. The details you see aren't lines, they're shadow-shapes.



★Think about how you design these shadow shapes.★

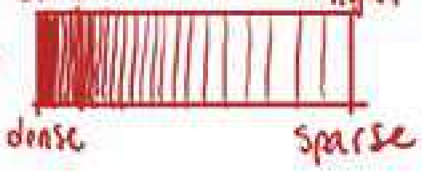
So, I start drawing those shapes, outlining where I see them.

④ As I start filling these in, I start thinking about the transitions from light → dark.

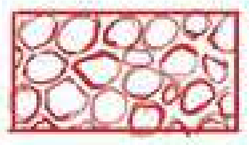


Our pens don't let us do this →

instead we get this, which is boring. →



So, looking at the reference, I see that this massive network of veins creates this sort of texture

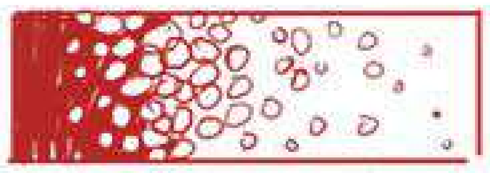


note: the sections in between the shapes are veins — your texture here is coming from the negative space.

This is a real texture, none of that filler cross-hatching stuff. It's a pattern you found on the object that implies how it feels to the touch.

Q: BUT HOW DO WE USE IT?

A: AS OUR TRANSITION FROM LIGHT TO DARK.

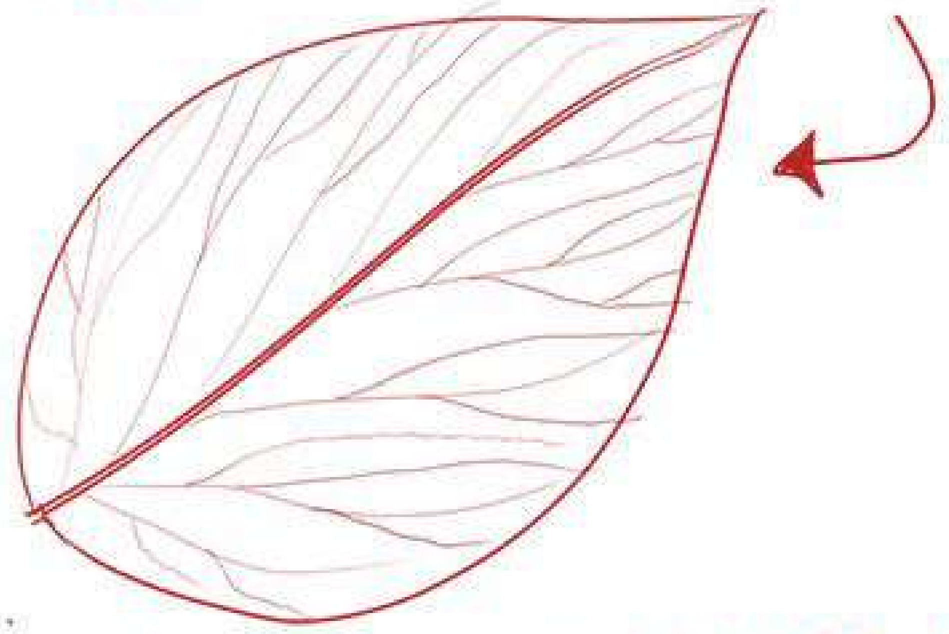


Same principle applies.

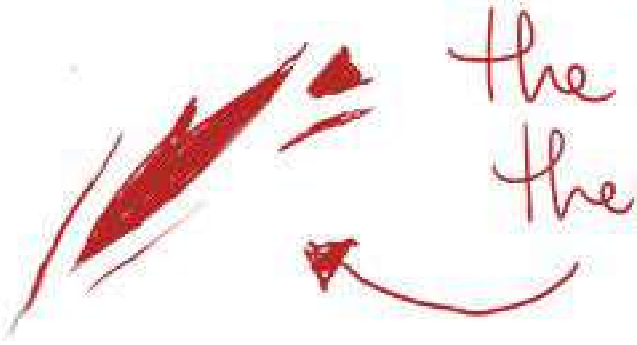
SOLID → DENSE ——→ SPARSE → BLANK.

One more point about shadow shapes vs lines.

You don't draw your veins with lines like this



You imply the presence of the major veins by pinching them between shadows.



Notice how they have thickness?

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  Cricket's abdominal segmentation
  Spider construction
  Ladybug construction
  The turning of form
  Identifying texture

Lesson 4: Applying Construction to Insects and Arachnids

Overview

Hate to read? No problem. **We can read the text to you**.

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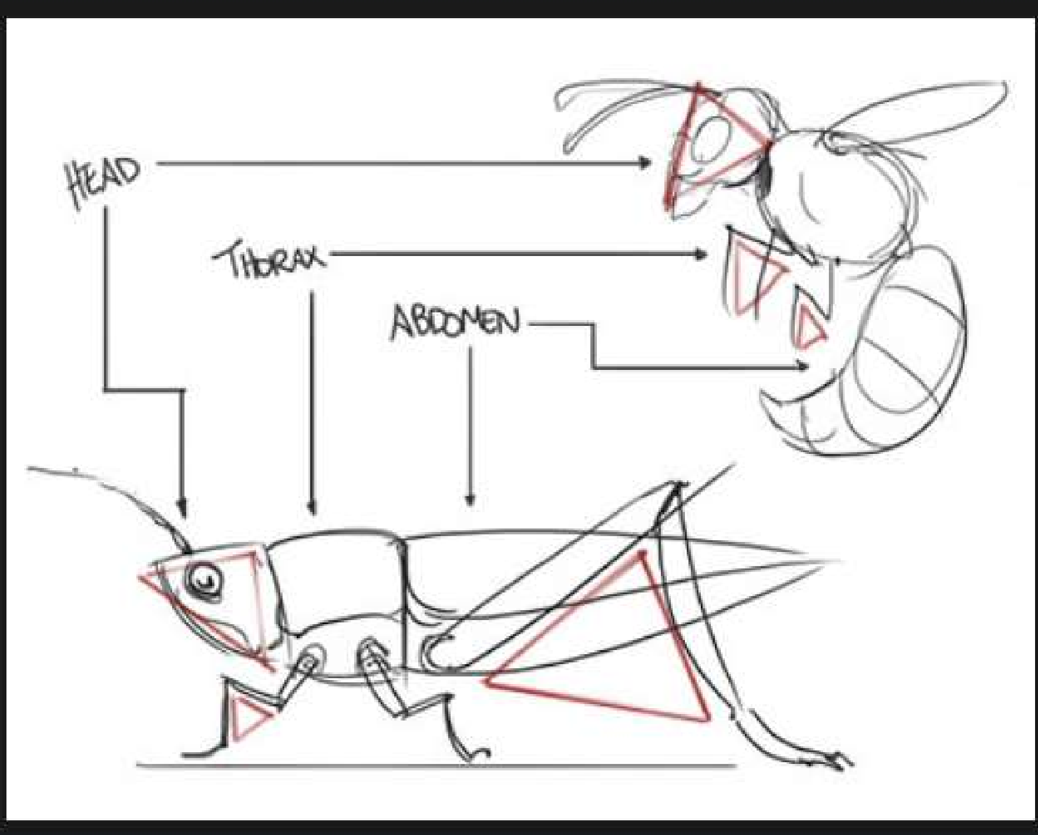
Introduction

Where the previous lesson focused primarily on flowing flat shapes as they push through all three dimensions of space, this lesson is going to set its sight on conveying the solidity of constructed forms, and combining them to create complex objects.

We also look at techniques that can be used to imbue insects' legs with solidity without causing them to appear too stiff as can often happen when employing constructional techniques too frivolously.

Anatomy



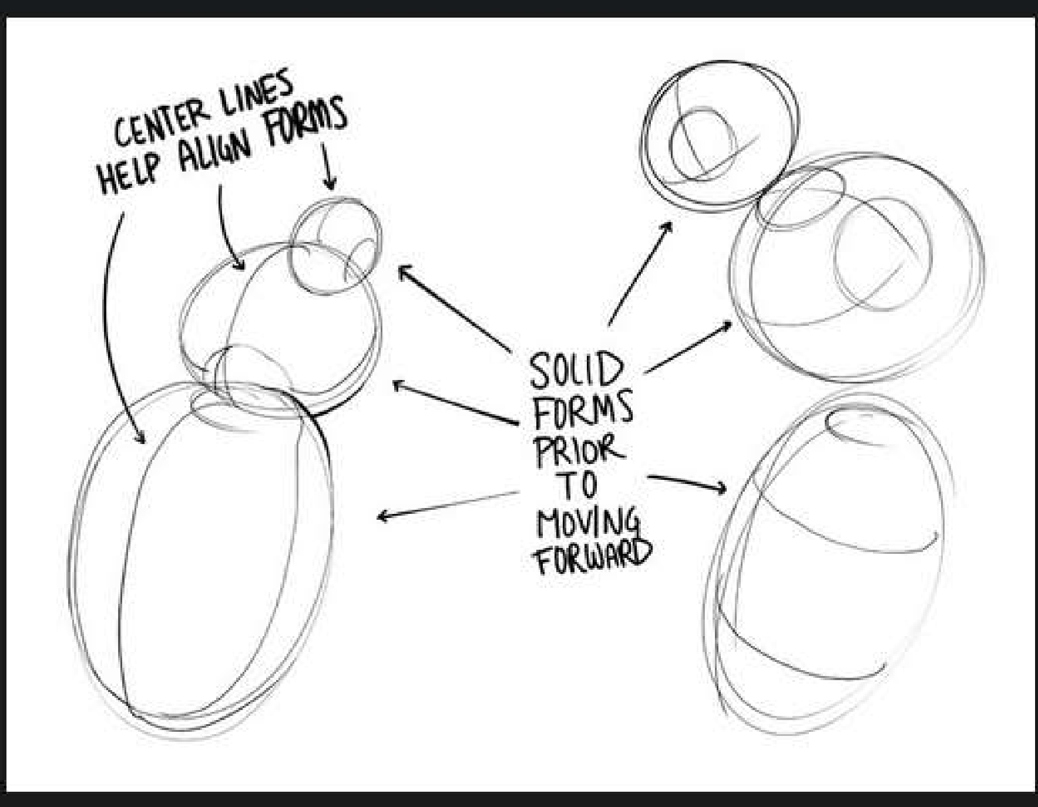
Insects (and arachnids) are composed of three major components:

- Head
- Thorax
- Abdomen

This holds true for the majority, though in some cases - like in beetles, spiders, and so on - you'll find that the head and thorax are fused. Despite this, you can still visually separate these elements fairly easily.

The other significant point to note is that insects (and some arachnids) display a shape language focused around the triangle. This can be seen in the general shapes of their heads, the way their legs bend, etc. Triangles naturally tend to be more sinister and unsettling as shapes (while squares are solid and circles are cuddly). That is, however, a conversation for a much later lesson.

Working with solid forms


CENTER LINES HELP ALIGN FORMS
SOLID FORMS PRIOR TO MOVING FORWARD

It's not uncommon to see artists starting with a loose, vague sketch to explore their drawing before committing more firmly to their lines. **That is not how we will be approaching things here**. That's not to say it's not an entirely valid approach to drawing, just that what we're doing here is specifically an exercise in construction.

As mentioned in previous lessons, construction is accomplished in successive passes, starting dead simple and gradually adding more forms to build up complexity.

At no point are we ever 'sketching'. Instead, every single pass should end with forms that feel solid to you - not like flat shapes pasted on top of one another, or loose collections of strokes on the page. Think about how these forms relate to one another, and add contour lines where you feel these relationships or the illusion of form need to be reinforced.

Try to perceive these solid forms as real, weighty objects in a three dimensional world, and look beyond the fact that you're drawing on a piece of paper. The page is not a flat surface - it is a window into a boundless world.

While Drawabox is not about making "pretty pictures", we know that's what students are hungering for. Feel free to indulge that craving with the following course from our sponsor, **New Masters Academy**:

- Drawing Insects, Tropical Animals, and Color Demonstration with Charles Hu
  This lesson from Charles' Dynamic Sketching course explores insects with more of a focus on the creation of vibrant, lively depictions, using looser sketching to lay in beetles, grasshoppers, and mantises, before painting on top with a bold use of gouache. Where Drawabox uses insects as a tool to explore and develop your spatial reasoning skills, Charles' demonstrations dig deep into making beautiful drawings that really stand out.

Sign up to New Masters Academy with the coupon code **DRAWABOX22** — you'll get a full **35% off your first billing cycle**.

Homework and exercises

Before starting the homework, be sure to go through all of the demonstrations included in this lesson. I strongly recommend drawing along with them as well and following them closely when doing so. If you choose to, you can include your attempts at following the demos in your homework, but they should constitute less than half of your insect drawings.

Also, remember that this homework must be drawn from reference. When looking for reference, I recommend that you specifically look for those of a higher resolution. Google's image search tools allows you to limit your search to *large* images, and I recommend you take advantage of this.

To get you started, here is an album of hundreds of high-res images. There's also this wonderful album by Andreas Kay, a naturalist and photographer who sadly passed away from cancer in 2019. Additionally, this gallery by Alex Wild was suggested by Lars Barnabee.

The homework assignment for this section is as follows:

- 2 pages of organic forms with **contour curves**, just like from lesson 2
- 4 pages of insect/arachnid drawings that are purely constructional with no texture or detail.
- 6 pages of insect/arachnid drawings that can go into texture and detail if you wish.

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here. You may also use a brush pen to fill in dark areas, but not for your linework.

Wasp Demo >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Staedtler Pigment Liners

These are what I use when doing these exercises. They usually run somewhere in the middle of the price/quality range, and are often sold in sets of different line weights - remember that for the Drawabox lessons, we only really use the 0.5s, so try and find sets that sell only one size.

Alternatively, if at all possible, going to an art supply store and buying the pens in person is often better because they'll generally sell them individually and allow you to test them out before you buy (to weed out any duds).

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Lesson 4: Applying Construction to Insects and Arachnids

Wasp Demo

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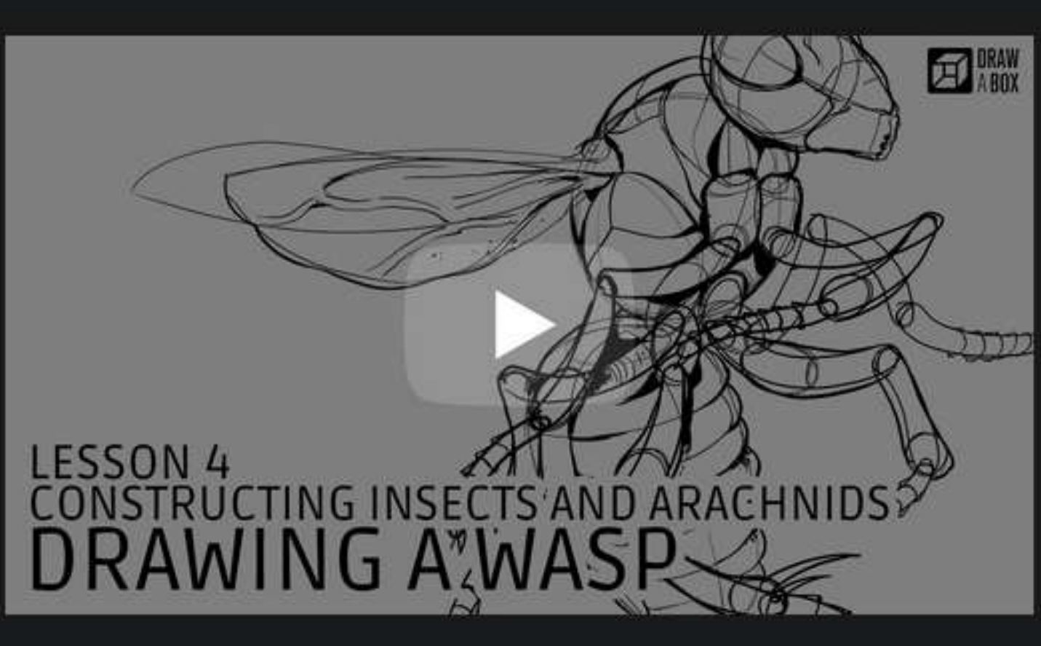
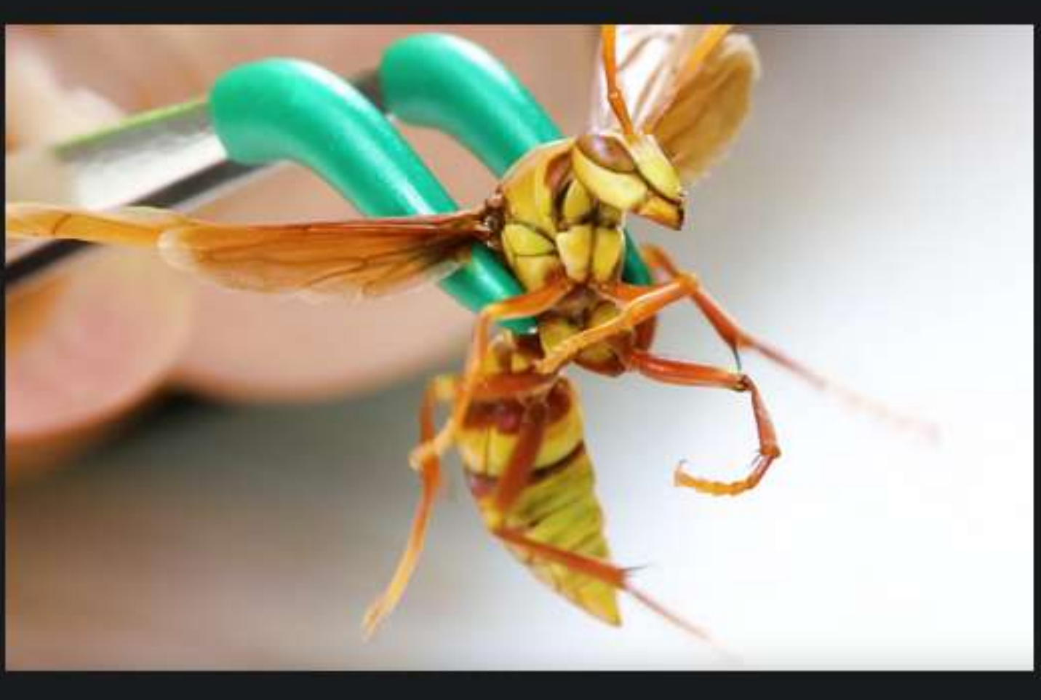


Demo Video

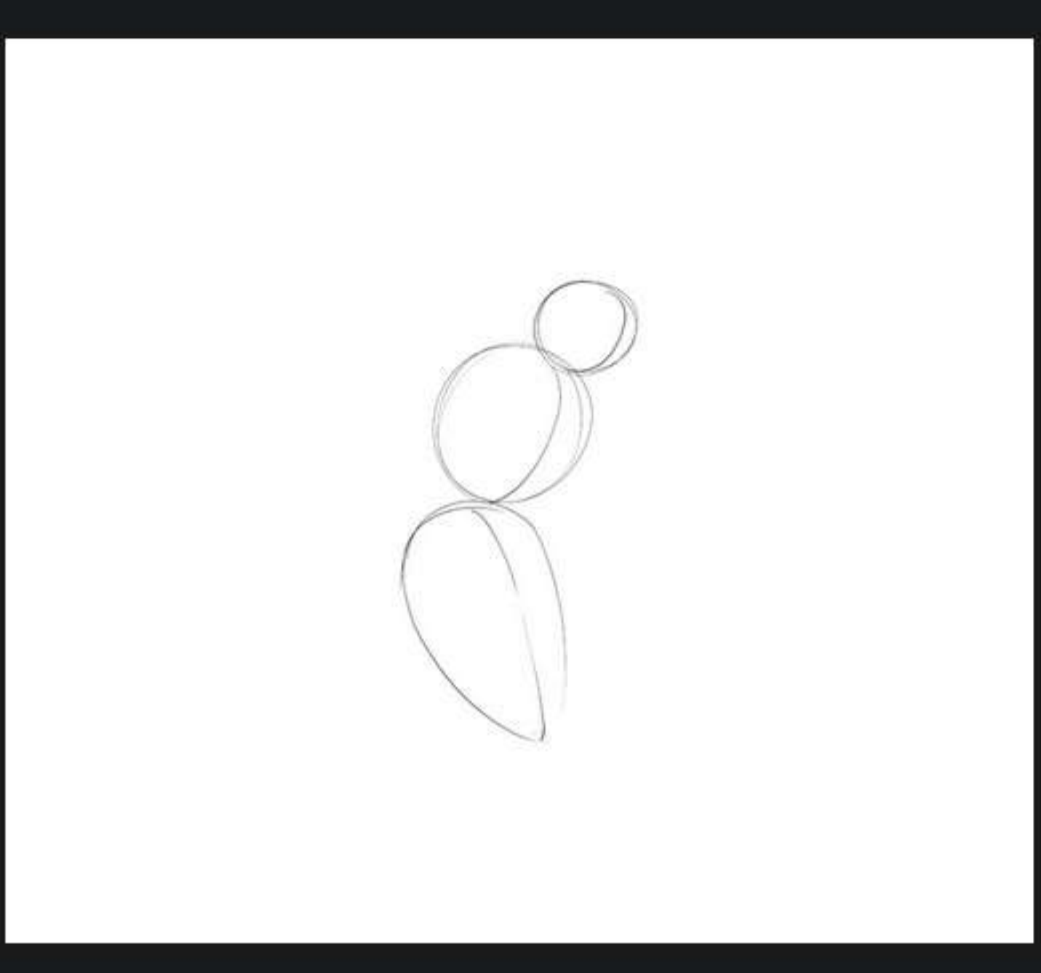
A great place to start is with a wasp - they've got a solid separation between the three major body masses (head, thorax, abdomen) and all kinds of spindly legs. They've also got natural contour lines that really lend themselves to establishing the illusion of 3D form without straying much from the reference itself.

The demo video includes full audio and discussion of the concepts demonstrated in the drawing.



Reference

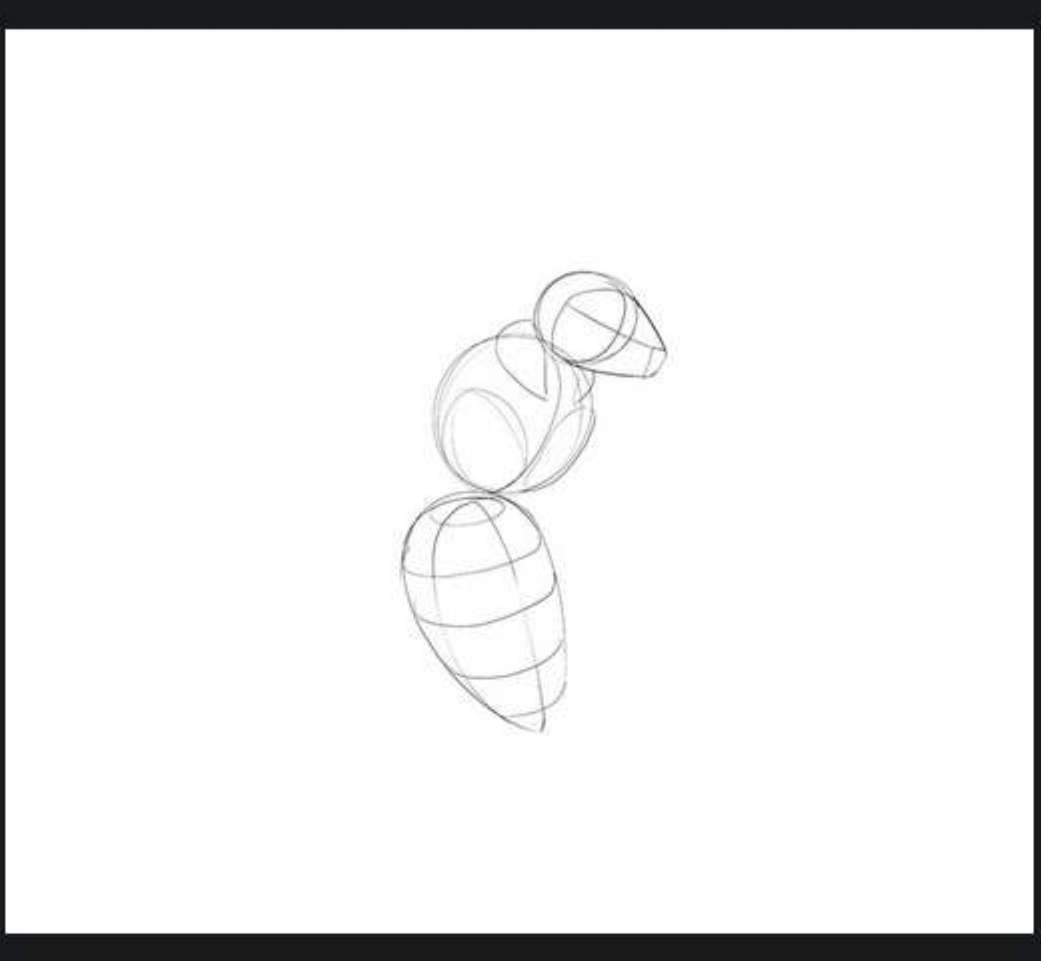
Here's the rather unsettling reference we'll be working from. Not the usual yellow jacket I'm used to, this one is known as the "Executioner Wasp". What a lovely name.



Step by step

To start with, we're going to lay down the three major masses:

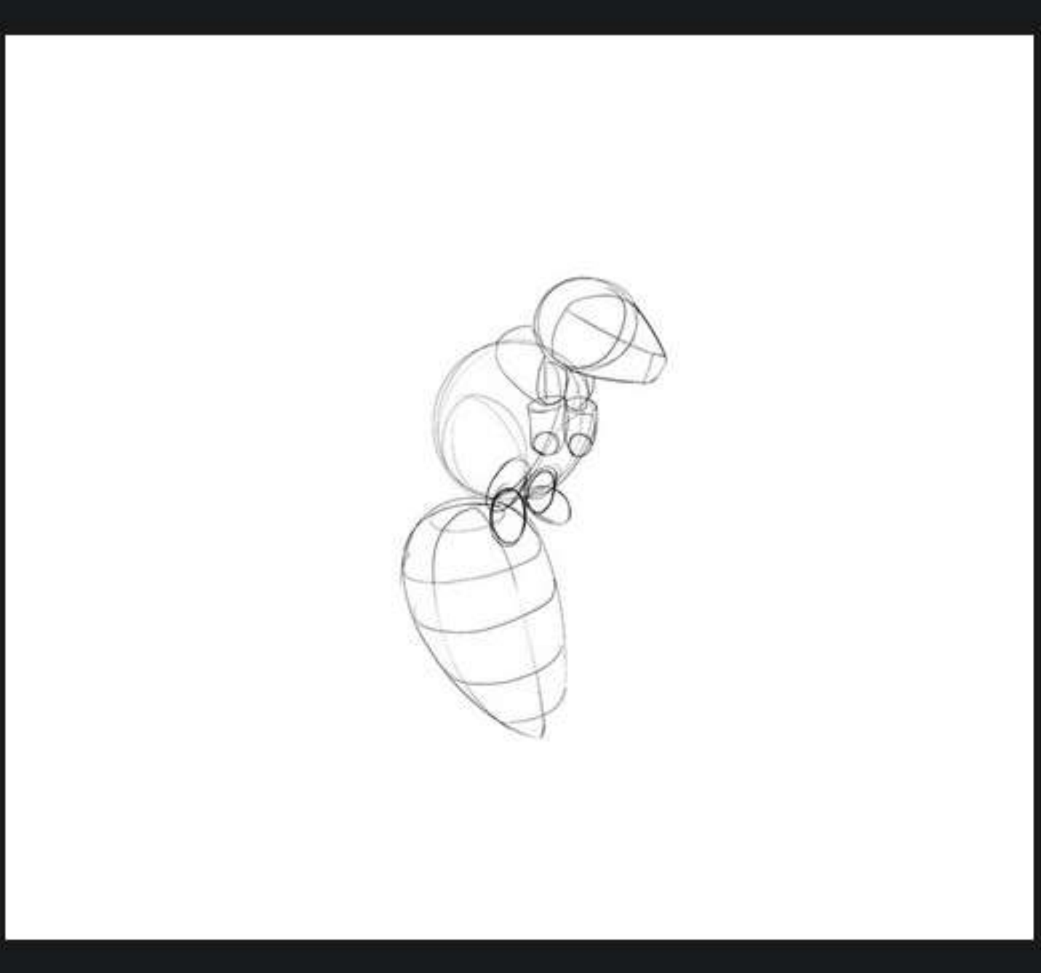
- Head (or more accurately, the cranium which constitutes only part of the head)
- Thorax, to which the wings and legs connect
- Abdomen



I did notice some additional masses present on the creature's body. It's important to understand that while we start from those three primary masses, we are not bound only to them. We just want to generally get them down first.

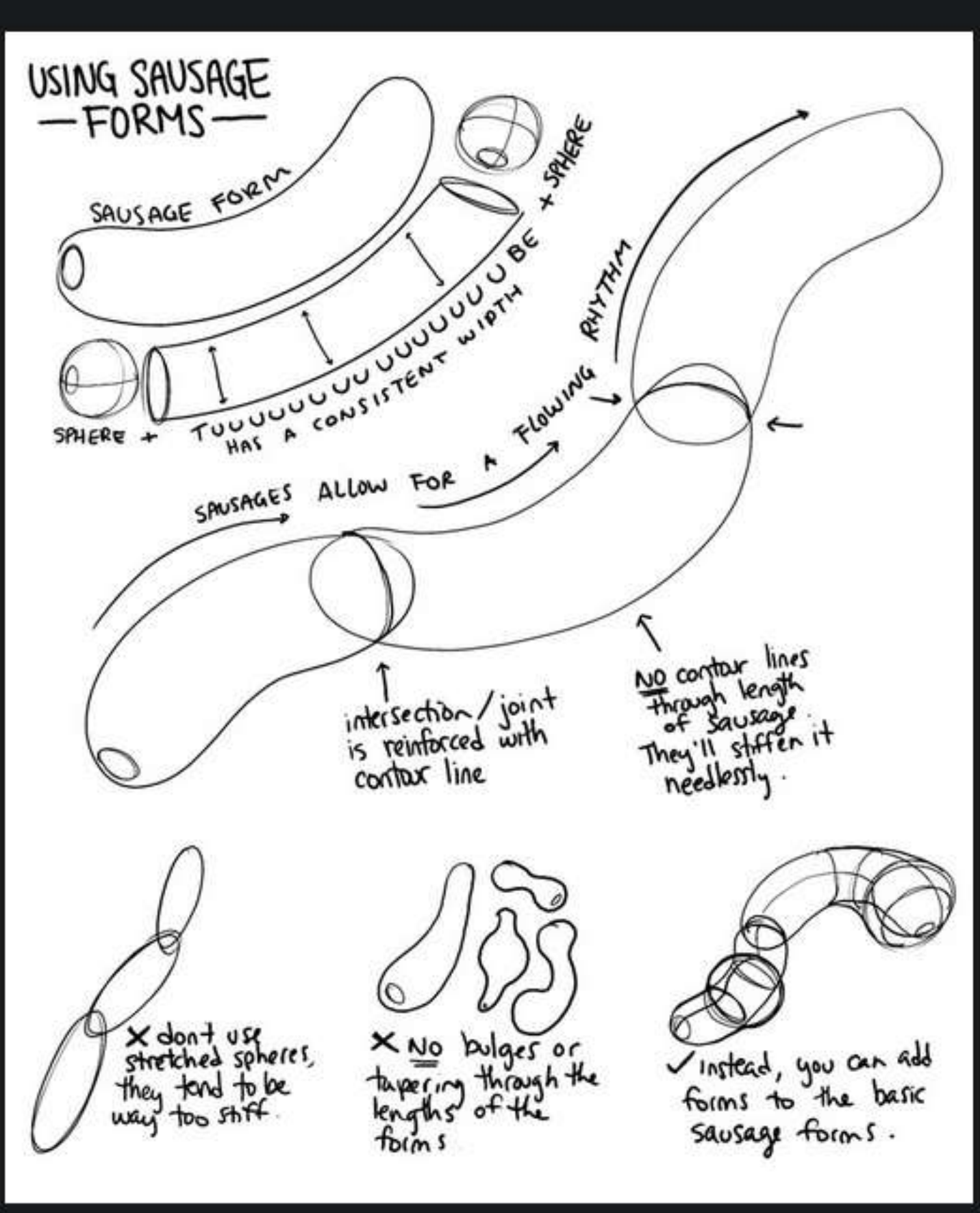
When you do add additional forms, you mustn't add them like stickers onto a flat image. You need to leverage your awareness of how these forms intersect and interact with one another - take your additional form and actually wrap it around the masses already present in the construction.

Also worth mentioning, I put down some contour lines to vaguely match the segmentation of the wasp's abdomen. I drew these to flow over the surface of my simpler mass rather than trying to tailor them to the specific segmentation visible in the reference, mainly because I wanted to use them to add extra solidity that the reference more or less gives me for free (rather than having to invent my own contour lines).



Next, I'm starting to point my attention to the legs. Before we get to them however, I noticed that there were some intermediary forms that connect them to the thorax, so I decided to drop them in as some solid volumes.

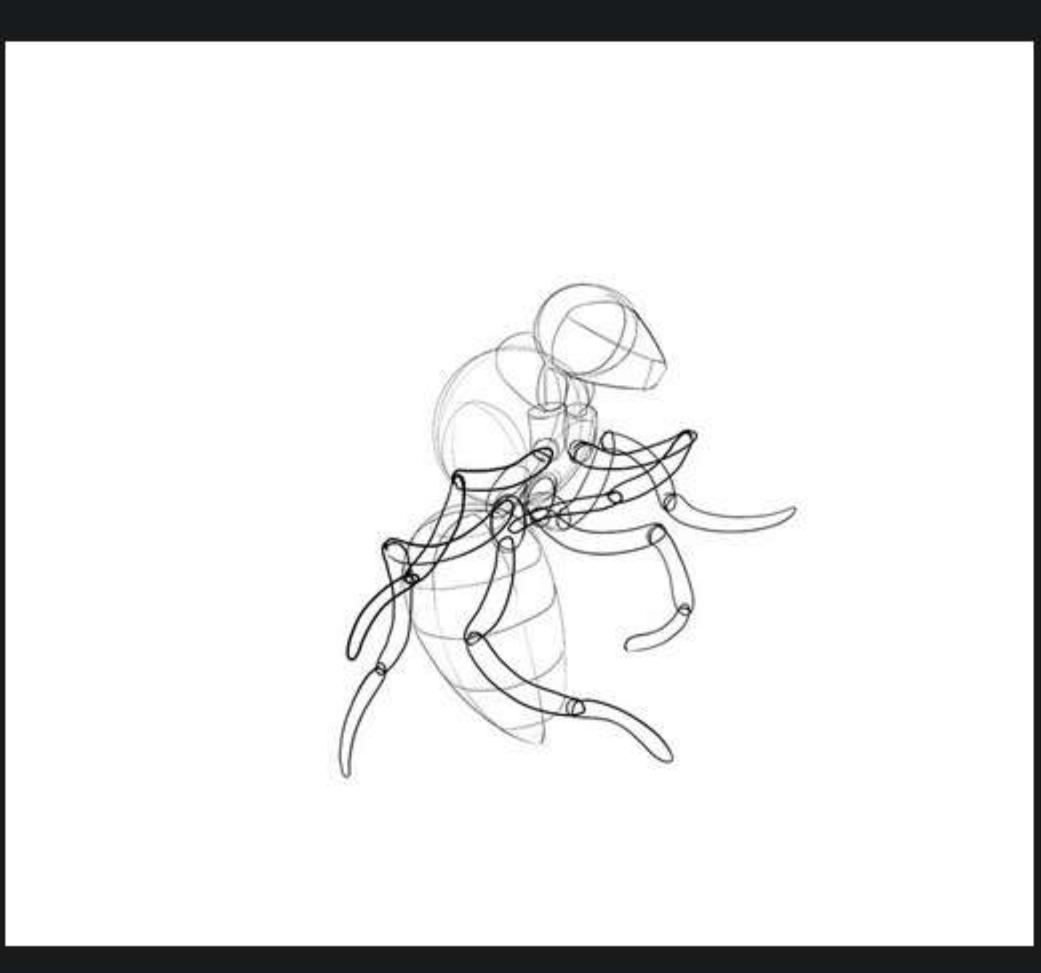
I didn't construct these in the same way I tackle legs (which you'll see next), because they seemed to exude more solidity than gesture. Whenever I'm applying a technique, I try to think about what that technique is best suited for, and whether or not that matches what I need right at that moment.


USING SAUSAGE —FORMS—
SAUSAGE FORM
SPHERE + TUUUUUUUUUUUUUUBE + SPHERE
HAS A CONSISTENT WIDTH
SAUSAGES ALLOW FOR A FLOWING RHYTHM
intersection/joint is reinforced with contour line
NO contour lines through length of sausage. They'll stiffen it needlessly.
✗ don't use stretched spheres, they tend to be way too stiff.
✗ NO bulges or tapering through the lengths of the forms
✓ instead, you can add forms to the basic sausage forms.

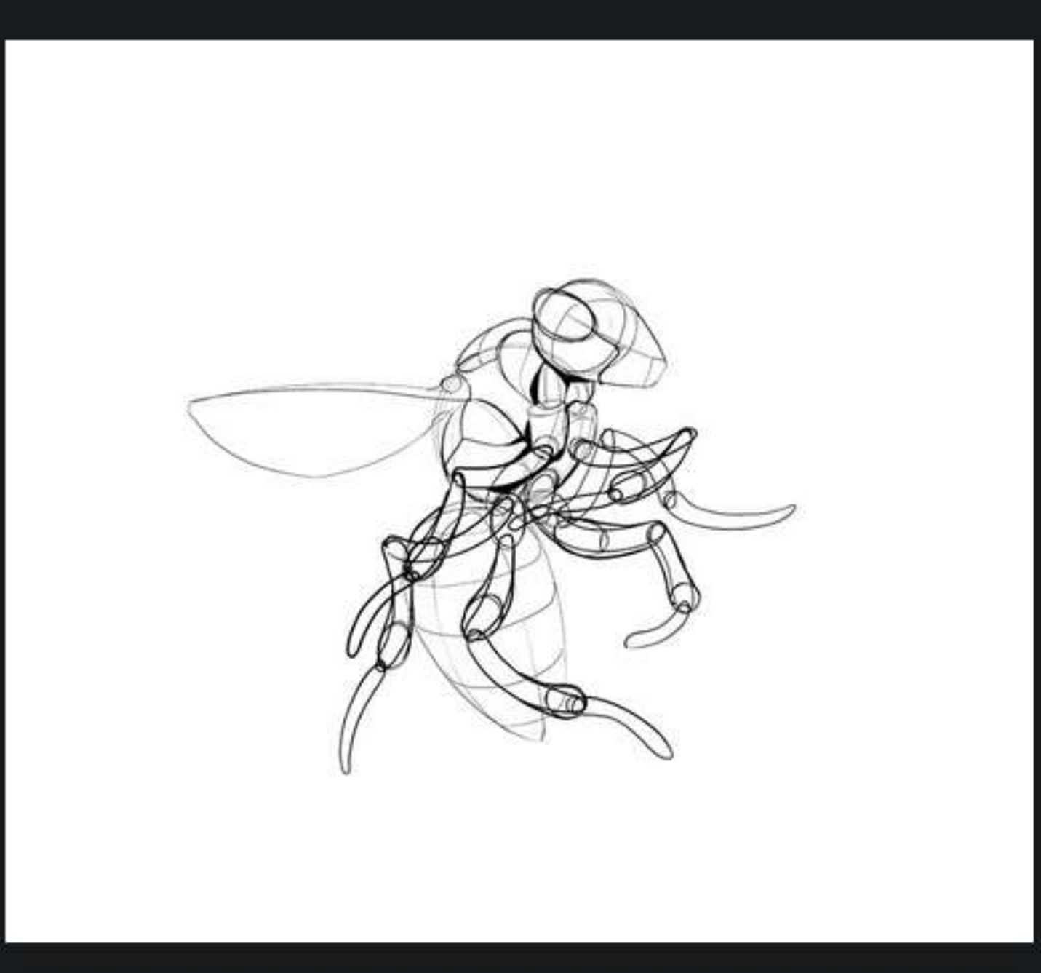
Now when tackling legs - be it those of an insect or those of an animal, I see a lot of different strategies being employed (most of which I've tried myself over the years). I've found that the most reliable approach is to construct legs out of a series of sausage segments.

By sausages, I mean the kinds of organic forms we introduced in lesson 2, though not quite as fat. They're essentially two spheres connected by a tube that maintains a consistent width through its length. This means no arbitrary swelling or pinching, as this will undermine its solidity.

The great thing about sausages is that they can strike a balance between the need for our forms to maintain the illusion of solidity, while also being quite gestural and flowing in their nature. We can reinforce the illusion of form with a single contour curve right at their joints where they intersect, and leave the rest free and clear.



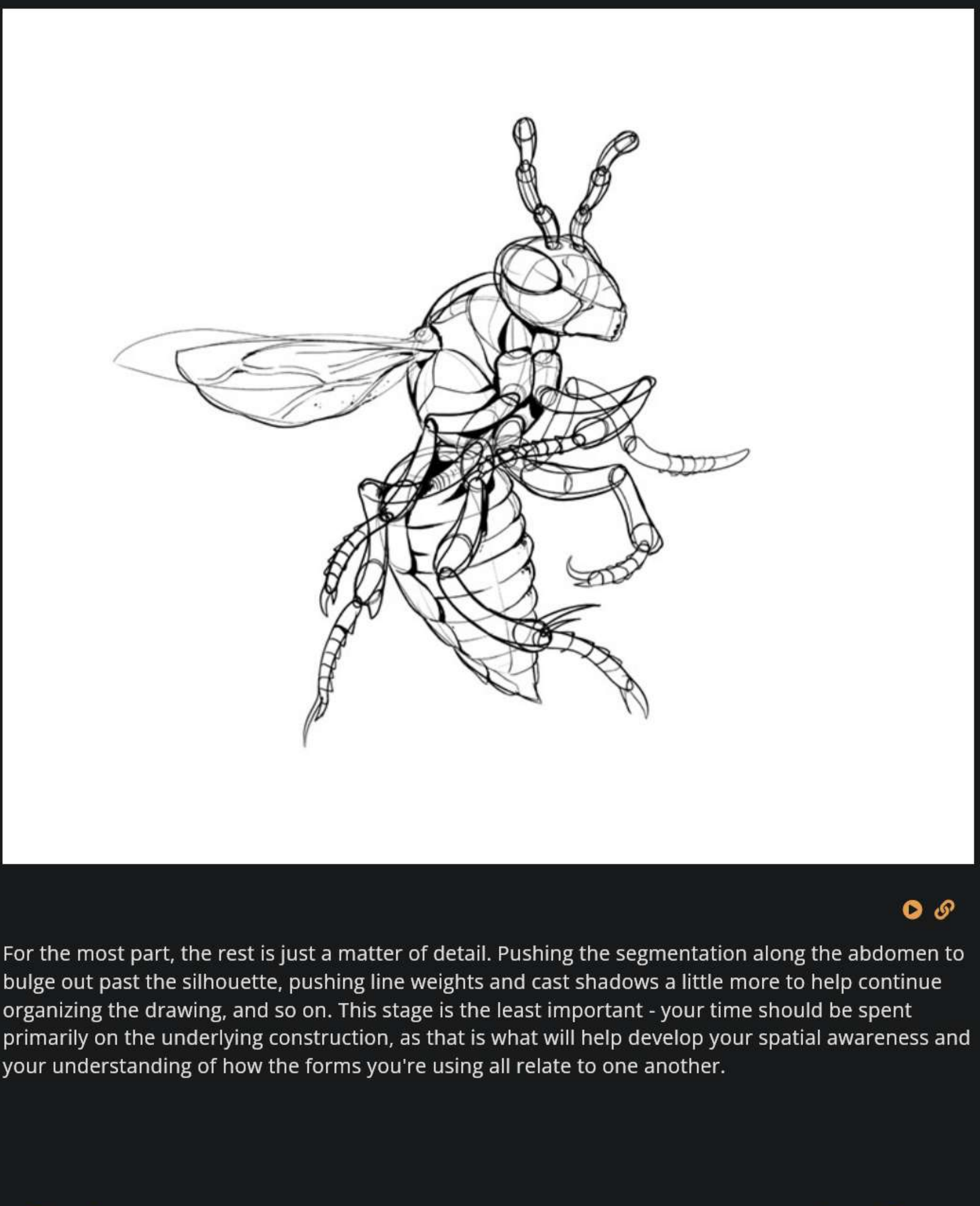
So, let's apply this to our wasp to achieve what appears to be something of a flying spaghetti monster. For each leg, I am focusing **only on that one leg**. When there's so many things floating around, it can be very easy to be distracted from your task. Stay focused only on the marks you're making at that moment and don't let yourself get overwhelmed.



Here I'm starting to organize my mess with a little extra line weight and a few simple cast shadows. I'm not doing this to replicate anything I see in my reference - just to subtly clarify what's going on in my drawing.

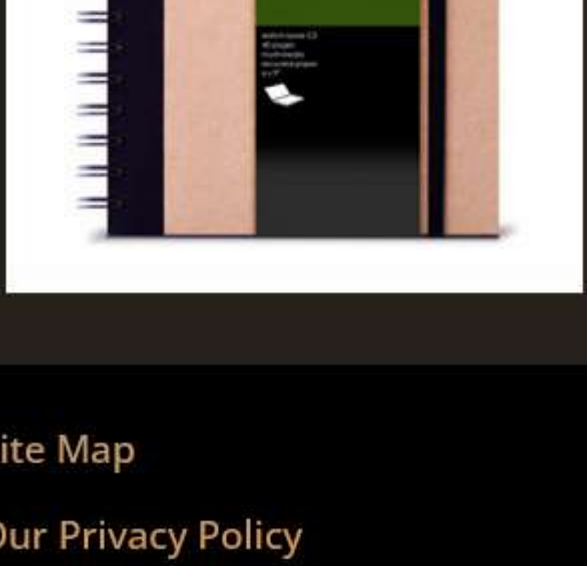
When you use line weight, it can be rather tempting to start going crazy with really thick lines, but I wouldn't advise it. Take it slow, and err on the side of subtlety. Don't use different pens, unless you need to fill in large cast shadow areas (in which case you can use a brush pen once you've established the outline of that shadow shape). In general, you should be doing all the linework - construction and line weight both - with a single pen.

I've also added a few additional forms - a relatively flat wing and some of the structure in the area it connects to the thorax, as well as the large eye.



For the most part, the rest is just a matter of detail. Pushing the segmentation along the abdomen to bulge out past the silhouette, pushing line weights and cast shadows a little more to help continue organizing the drawing, and so on. This stage is the least important - your time should be spent primarily on the underlying construction, as that is what will help develop your spatial awareness and your understanding of how the forms you're using all relate to one another.

<<< Overview
Louse Demo >>>



Cottonwood Arts Sketchbooks

These are my favourite sketchbooks, hands down. Move aside Moleskine, you overpriced gimmick. These sketchbooks are made by entertainment industry professionals down in Los Angeles, with concept artists in mind. They have a wide variety of sketchbooks, such as toned sketchbooks that let you work both towards light and towards dark values, as well as books where every second sheet is a semitransparent vellum.

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Lesson 4: Applying Construction to Insects and Arachnids

Louse Demo

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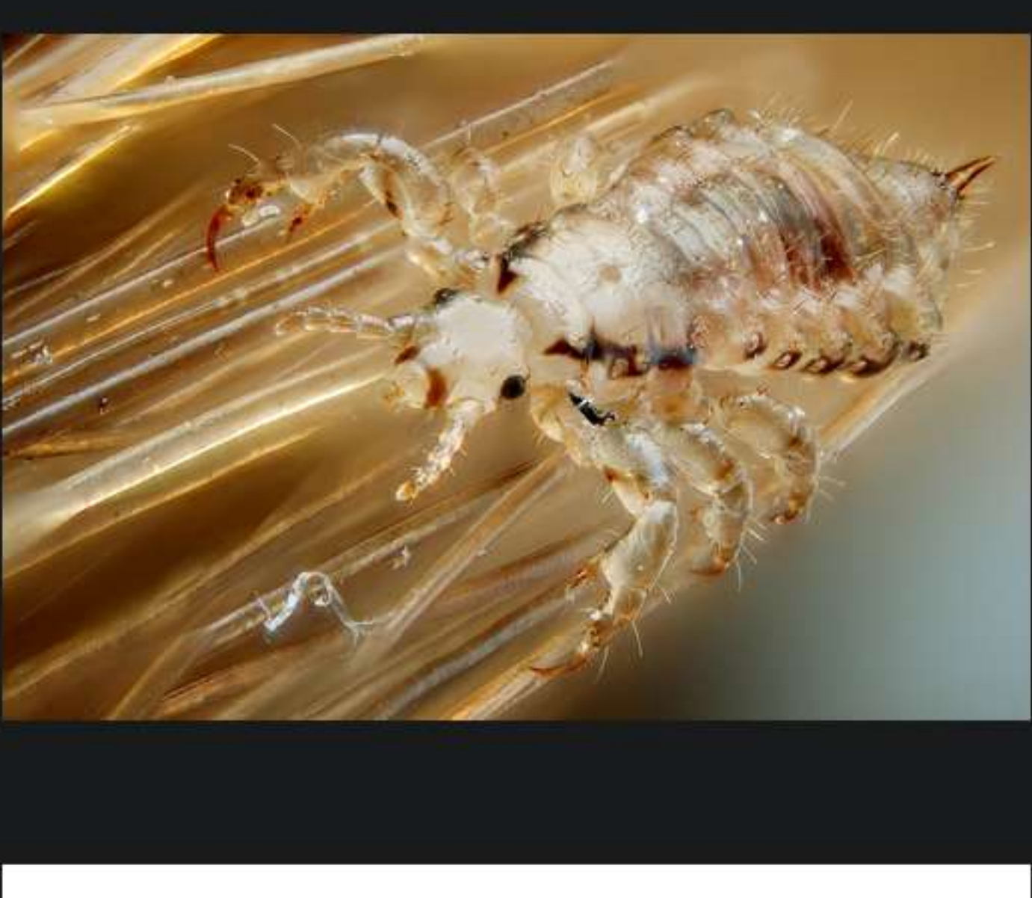
Demo Video

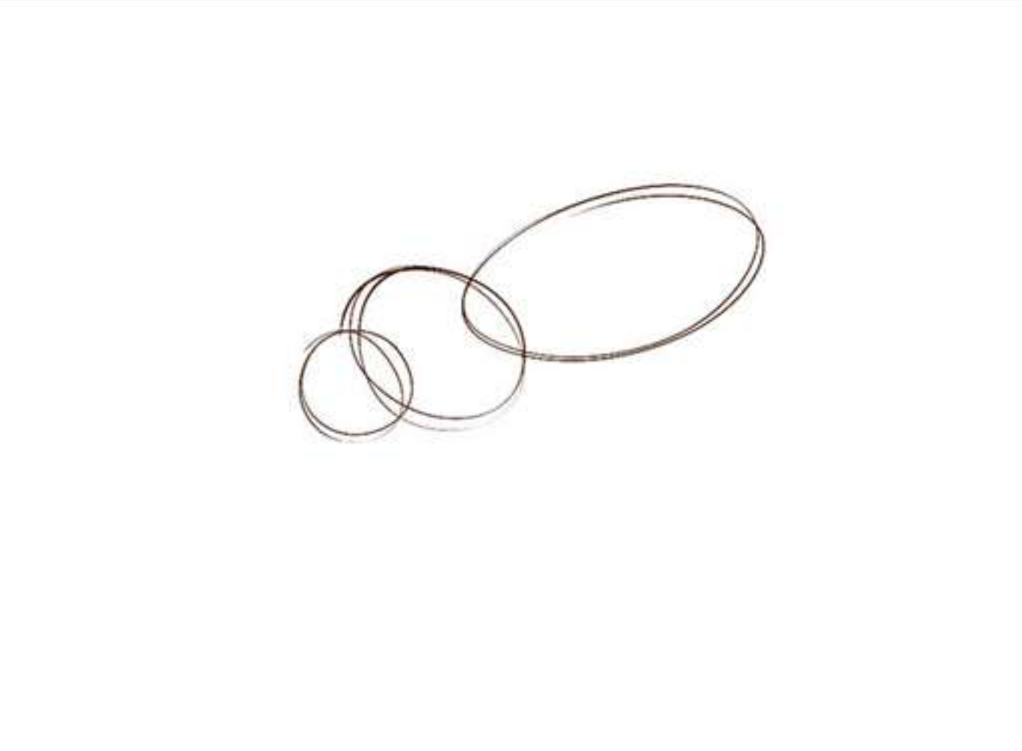
This one's a rather interesting example, as the head louse is not something one often thinks about when it comes to insects. Having a somewhat translucent body, it can be a little tricky to break down, but it really comes down to all the same forms as everything else.

The demo video includes full audio and discussion of the concepts demonstrated in the drawing.



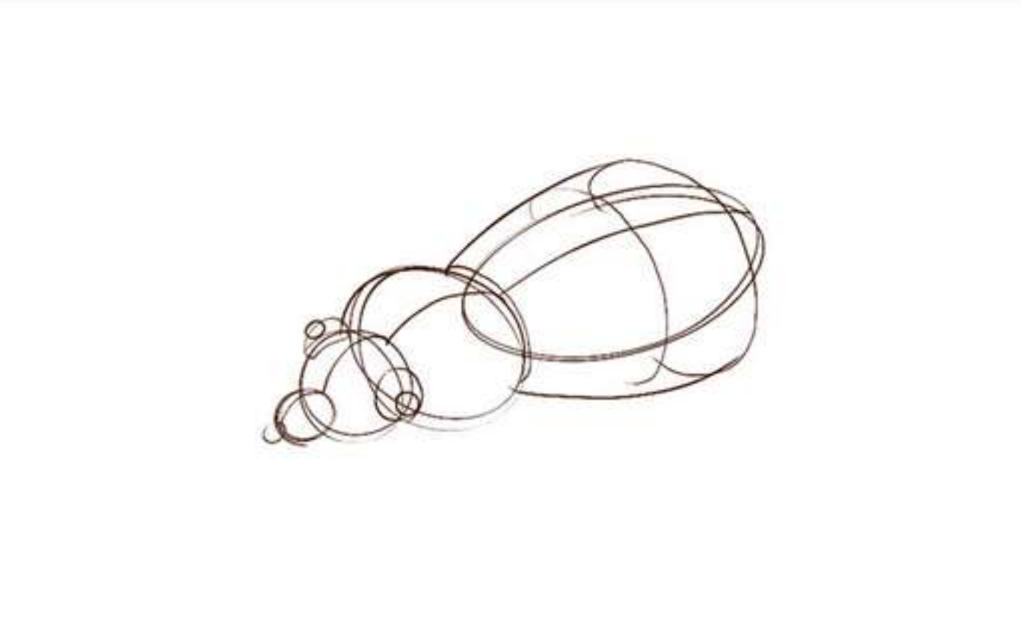
Reference

Here's our reference image. As you can see, its body is somewhat translucent, so you need a careful eye to distinguish all of its major components. Still, look closely enough, and it'll start to become a little clearer.



Step by step

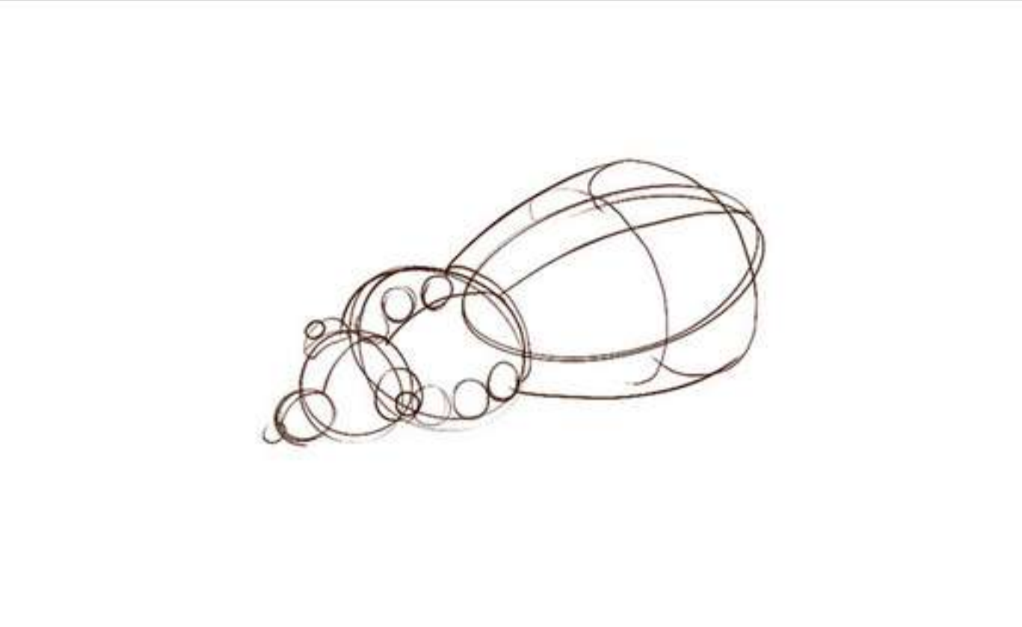
Like many of our other insects, the louse is composed of a head (cranium), a thorax and an abdomen. You'll notice that I have not yet included the large skirt-like mass that covers its abdomen. If you look closely at the reference, you'll see that it's somewhat distinguished from the darker mass that is visible through it. As such, I decided to separate the two, and build out this narrower abdomen first.



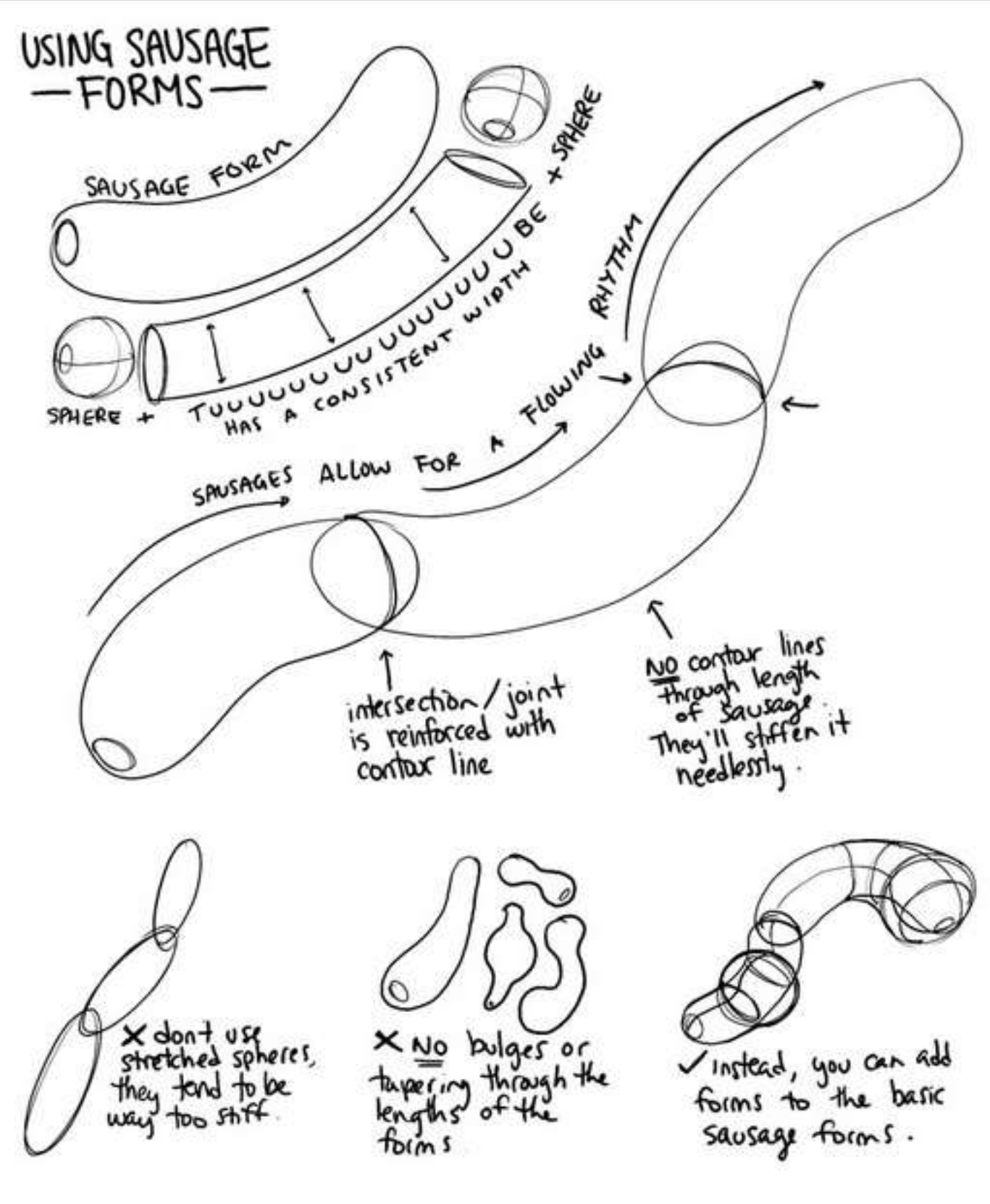
Here, I'm blocking in the skirt form. I'm also leveraging a few contour lines - both around the skirt as well as a center line passing down the length of the whole body (from head, to thorax, to abdomen) to help establish how these masses align to one another.

This can be tricky at first, and requires you to really think about how your line runs over the surface of these forms, so don't rush through it. Give yourself the time to think carefully about how those surfaces turn through space.

Additionally, you'll notice some of the extra forms I've added to the head. At first glance, you may feel that the eyes - or at least the beady black things I assume are eyes - attach directly to the cranial mass, but if you look more closely you'll see that there's something of a supporting mass between them. I've drawn this in as a separate ball, even though it's quite subtle.



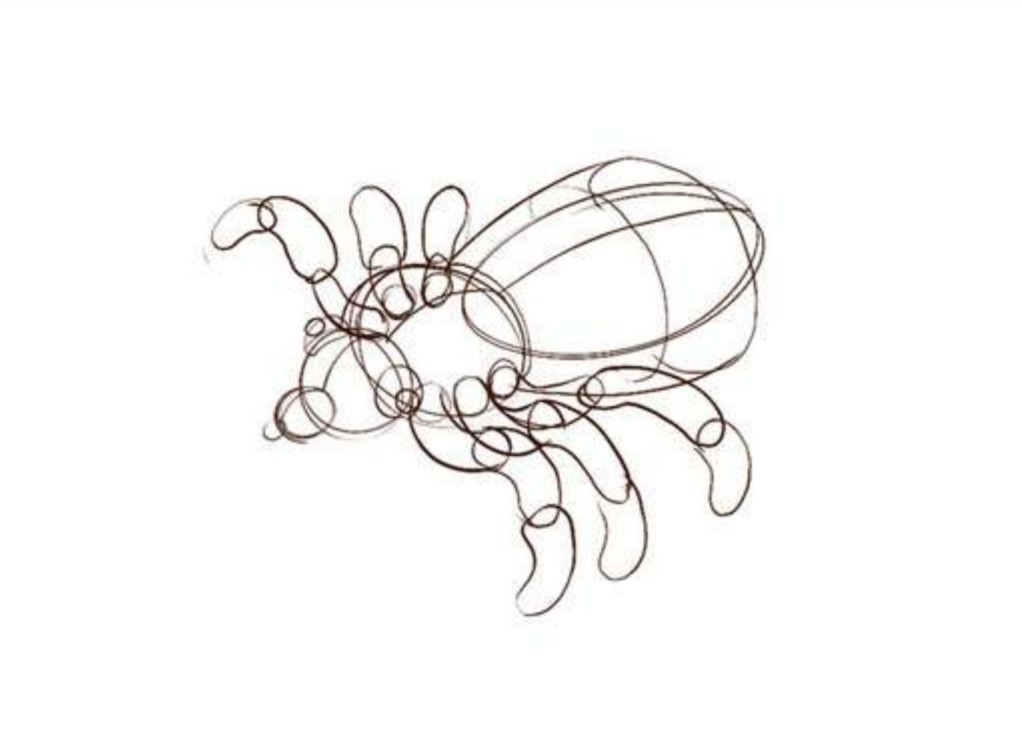
Here the only change are the ellipses I've drawn on either side of the thorax. This lays down the footprint of where the legs will connect.


USING SAUSAGE
— FORMS —
SAUSAGE FORM
SPHERE + TUUUUUUUUUUUUUUBE + SPHERE
HAS A CONSISTENT WIDTH
SAUSAGES ALLOW FOR A FLOWING RHYTHM
intersection / joint is reinforced with contour line
NO contour lines through length of sausage. They'll stiffen it needlessly.
✗ dont use stretched spheres, they tend to be way too stiff.
✗ No bulges or tapering through the lengths of the forms
✓ instead, you can add forms to the basic sausage forms.

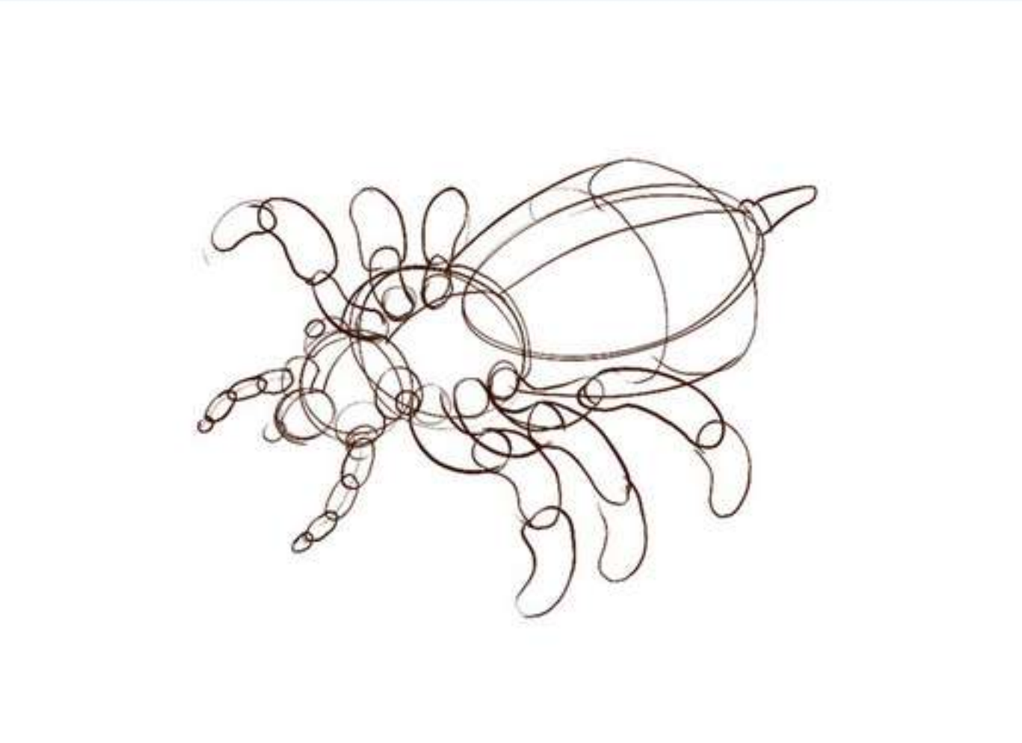
Now when tackling legs - be it those of an insect or those of an animal, I see a lot of different strategies being employed (most of which I've tried myself over the years). I've found that the most reliable approach is to construct legs out of a series of sausage segments.

By sausages, I mean the kinds of organic forms we introduced in lesson 2, though not quite as fat. They're essentially two spheres connected by a tube that maintains a consistent width through its length. This means no arbitrary swelling or pinching, as this will undermine its solidity.

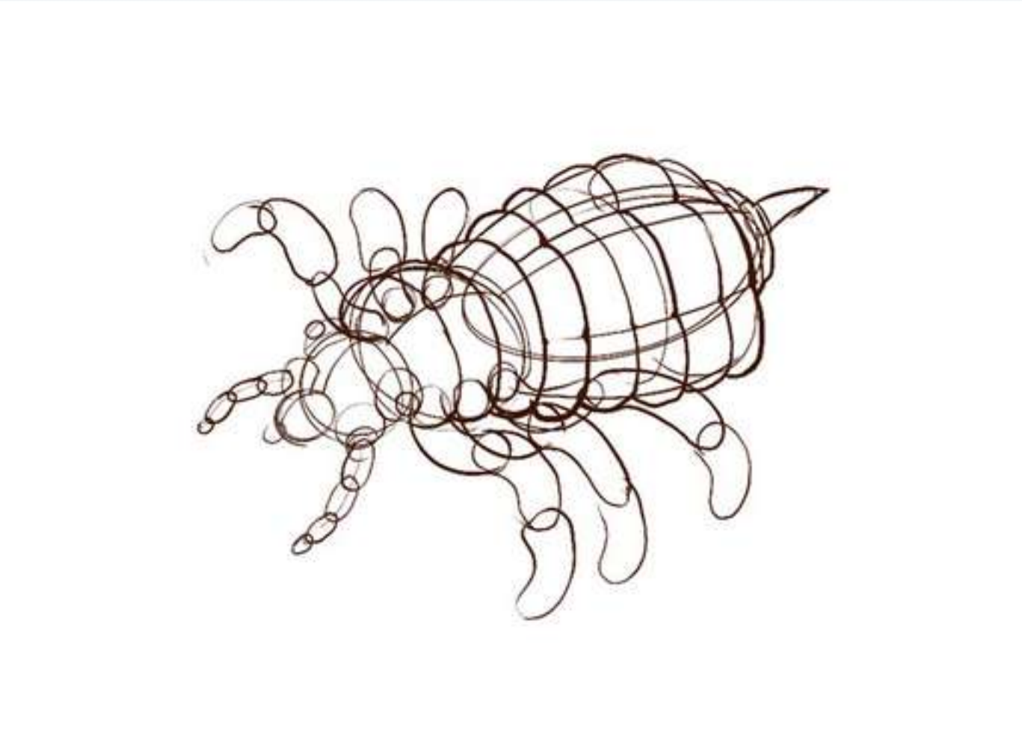
The great thing about sausages is that they can strike a balance between the need for our forms to maintain the illusion of solidity, while also being quite gestural and flowing in their nature. We can reinforce the illusion of form with a single contour curve right at their joints where they intersect, and leave the rest free and clear.



So, lets go ahead and apply that methodology to its legs. Simple sausage forms, interconnecting with one another. No odd swelling or pinching, just basic sausages so we can maintain their solidity.



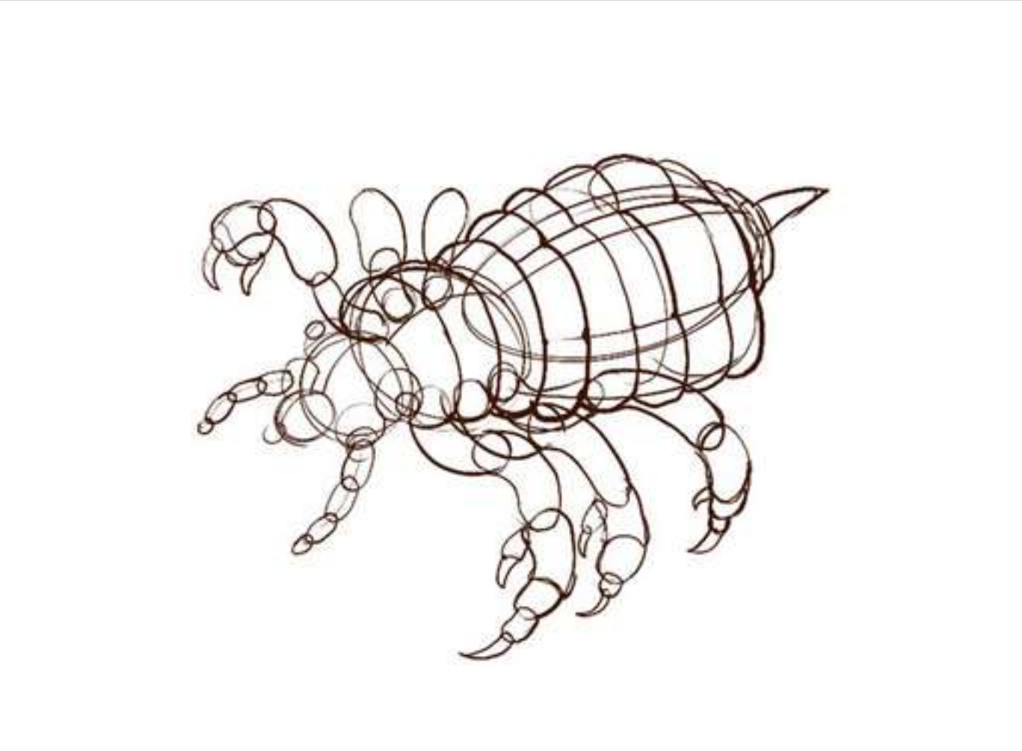
I did decide to apply the "stretched spheres" approach to the antennae however, as upon examining the reference, I felt they weren't quite as flexible, or at least didn't look flexible enough to merit the full sausages. So as always, identify the task ahead of you and pick the best technique for that particular problem, rather than seeing every problem as a nail, just because you've got a hammer in your hand.



Now, one of the most satisfying aspects of this particular subject (at least in my opinion) is the ribbing along its skirt. It's got that nice ballooning effect that pushes past the silhouette.

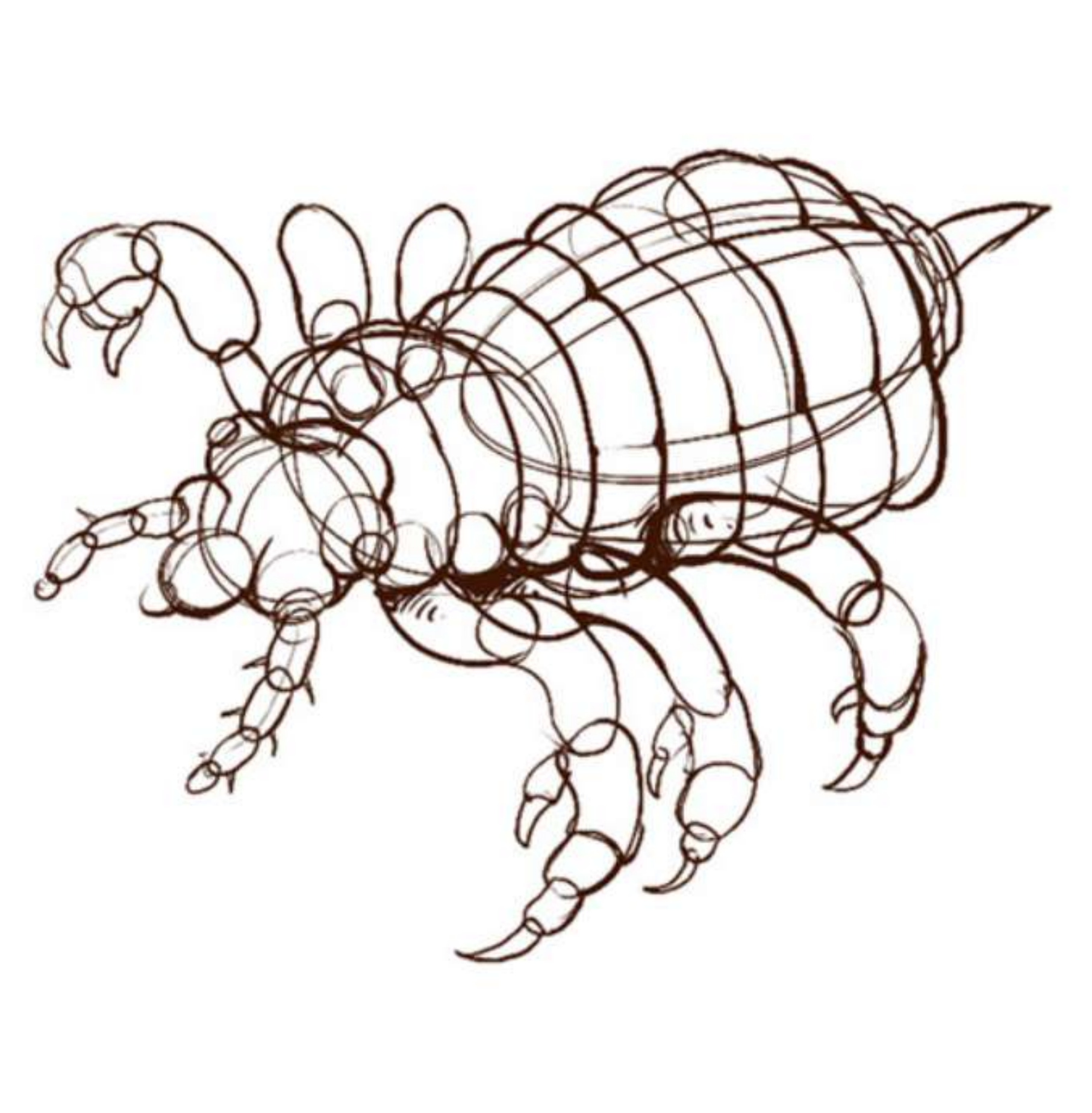
Notice though how it comes down in three rows, so I've actively drawn lines to split up those rows first before drawing the ribbing itself.

Ultimately the ribbing is just made up of glorified contour lines, wrapping around the form and tucking in or ballooning out where I want to modify the appearance of that surface.



As you may have noticed, I left the claws out from the initial leg construction, as they were more complex. Ultimately it is preferable to work on the entire drawing all at once, rather than focusing in on any one area until it's done. This allows us to keep building up complexity for the whole drawing in an even manner.

The claws are, however, really just following the same principle as the legs, in that they're mostly sausage-like forms intersecting with one another.



Just an extra touch of line weight here to help clarify certain overlapping forms, but nothing too different from the previous step. I'm not too preoccupied with texture on this one, as my focus has primarily been identifying and capturing the semi-translucent forms, all of which were quite intriguing in how they were layered on top of one another.

<<< Wasp Demo | Video Demos >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

PureRef

This is another one of those things that aren't sold through Amazon, so I don't get a commission on it - but it's just too good to leave out. PureRef is a fantastic piece of software that is both Windows and Mac compatible. It's used for collecting reference and compiling them into a moodboard. You can move them around freely, have them automatically arranged, zoom in/out and even scale/flip/rotate images as you please. If needed, you can also add little text notes.

When starting on a project, I'll often open it up and start dragging reference images off the internet onto the board. When I'm done, I'll save out a '.pur' file, which embeds all the images. They can get pretty big, but are way more convenient than hauling around folders full of separate images.

Did I mention **you can get it for free**? The developer allows you to pay whatever amount you want for it. They recommend $5, but they'll allow you to take it for nothing. Really though, with software this versatile and polished, you really should throw them a few bucks if you pick it up. It's more than worth it.

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- Layered segmentation
- Cricket's abdominal segmentation
- Spider construction
- Ladybug construction
- The turning of form
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Lesson 4: Applying Construction to Insects and Arachnids

Video Demos

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The demos listed here have no written counterpart.

Scorpion Demo

Scorpions, due to the sheer complexity of their segmentation and the different kinds of components involved in their construction, are often considered to be quite difficult. Here's how I'd go about tackling one.

<<< Louse Demo

Black Widow Demo >>>

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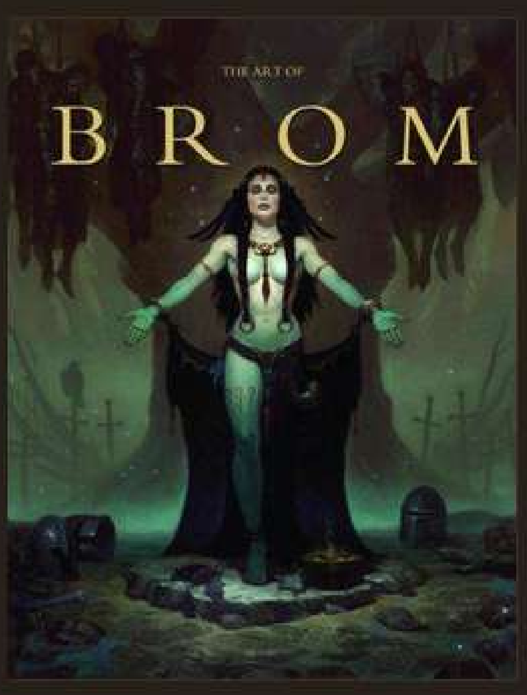

The Art of Brom

Here we're getting into the subjective - Gerald Brom is one of my favourite artists (and a pretty fantastic novelist!). That said, if I recommended art books just for the beautiful images contained therein, my list of recommendations would be miles long.

The reason this book is close to my heart is because of its introduction, where Brom goes explains in detail just how he went from being an army brat to one of the most highly respected dark fantasy artists in the world today. I believe that one's work is flavoured by their life's experiences, and discovering the roots from which other artists hail can help give one perspective on their own beginnings, and perhaps their eventual destination as well.

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Lesson 4: Applying Construction to Insects and Arachnids

Black Widow Demo

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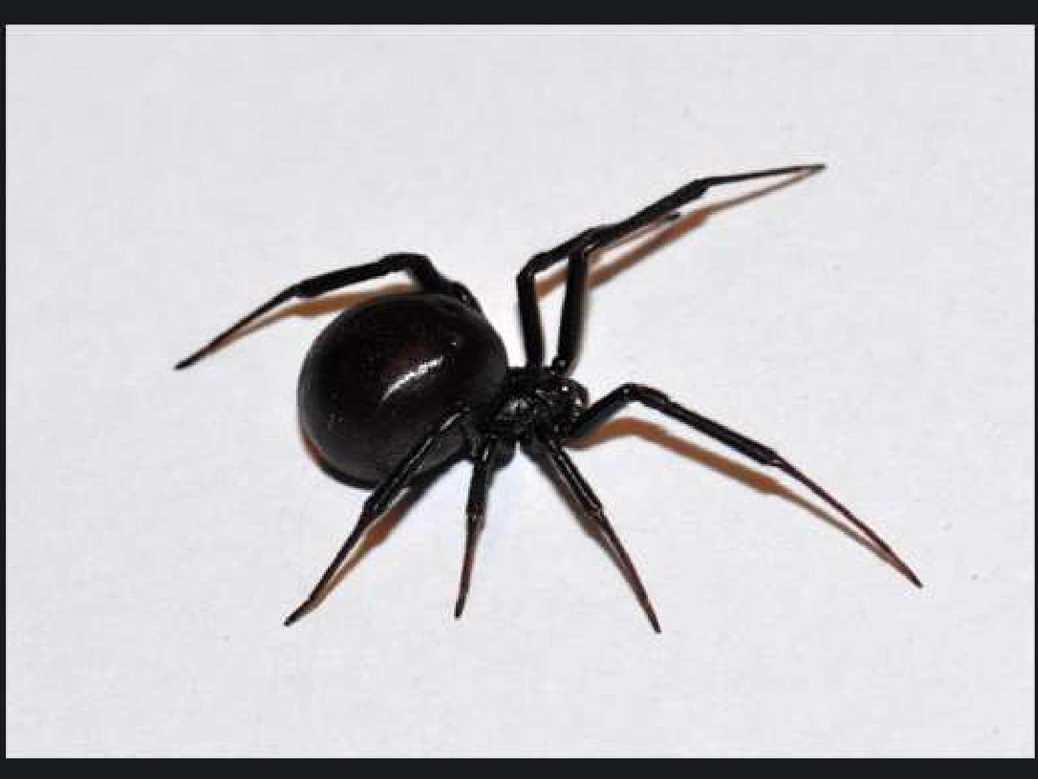
Demo video

We're going to start this off with a particularly disturbing creature - the notorious black widow spider.

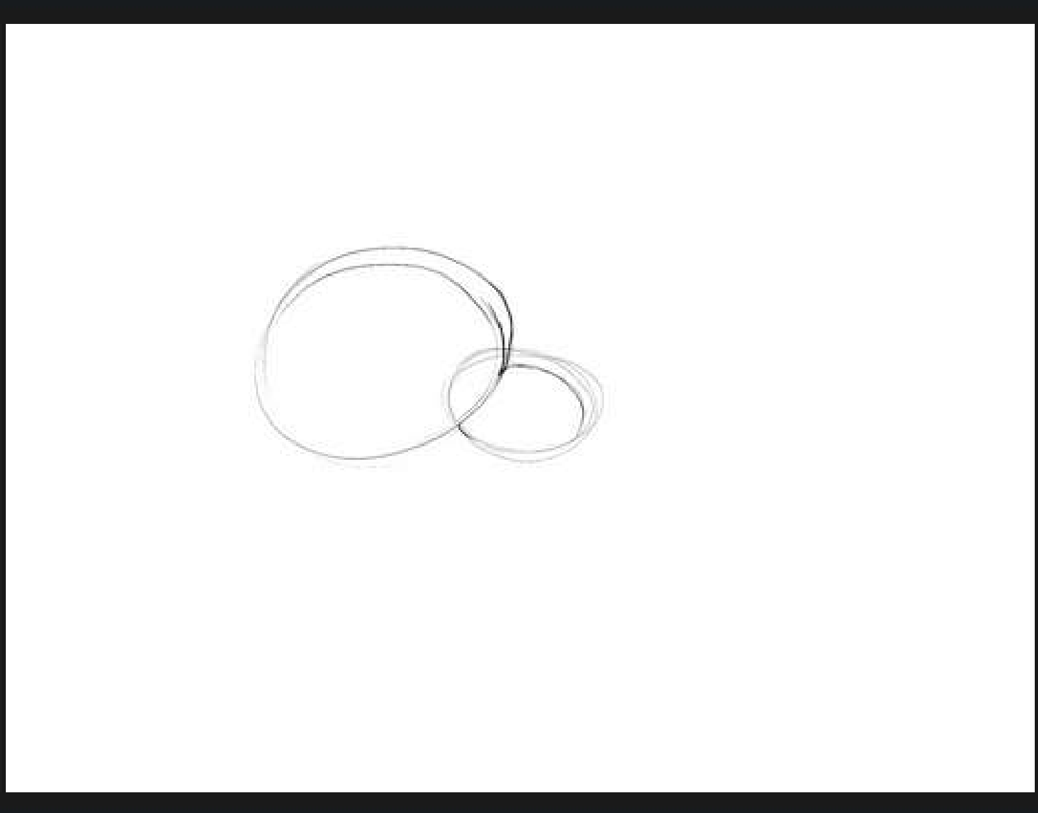
This recording has no accompanying audio commentary.



Reference

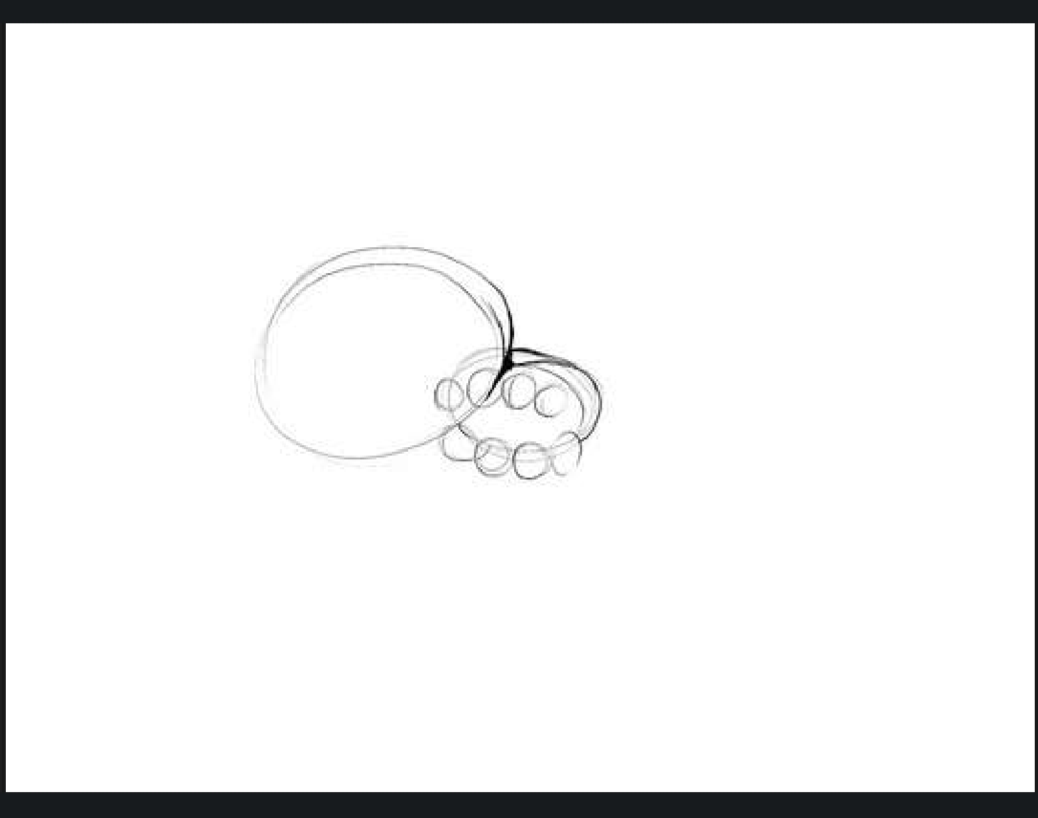
Unfortunately I wasn't able to get reference with a pose I liked that had the iconic red hour glass on it. Oh well.

This photograph was taken by Bo Jonsson.



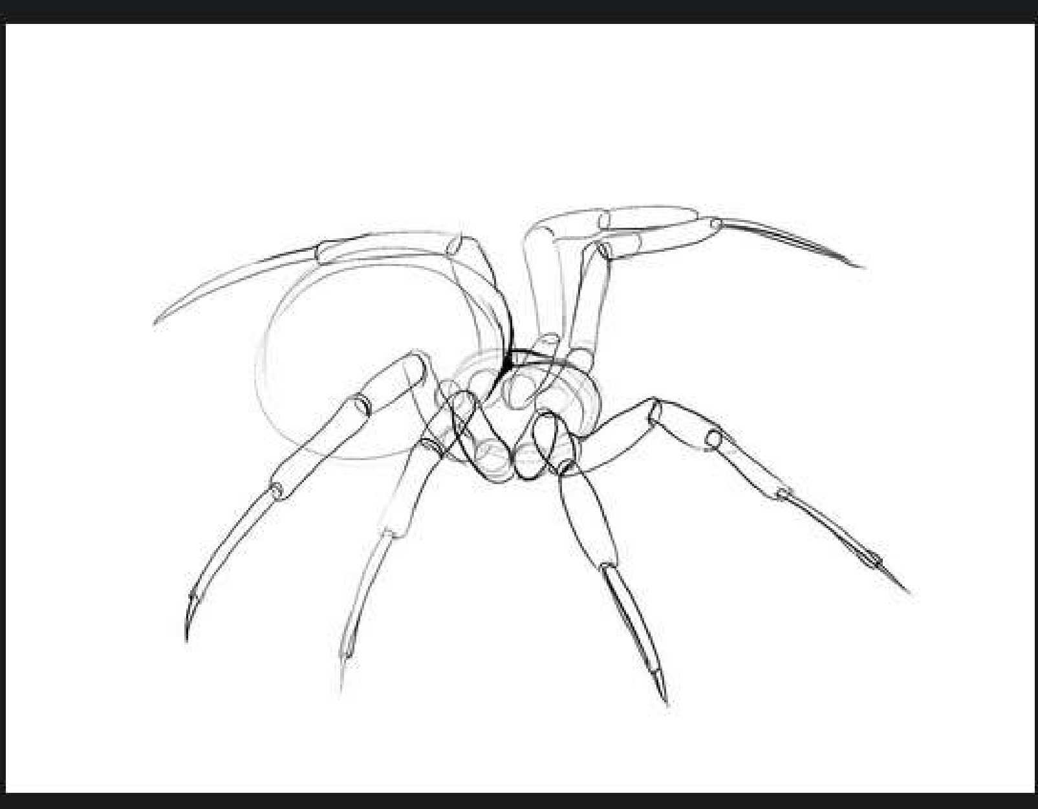
Step by step

So you want to start out by fleshing out your three major forms - head, thorax and abdomen. Even in the case of spiders, with their cephalothorax (fused head/thorax), I'll usually still block them out as separate masses very close together, but in this particular situation the reference doesn't really show me much of the head. So, we've got the thorax and abdomen.



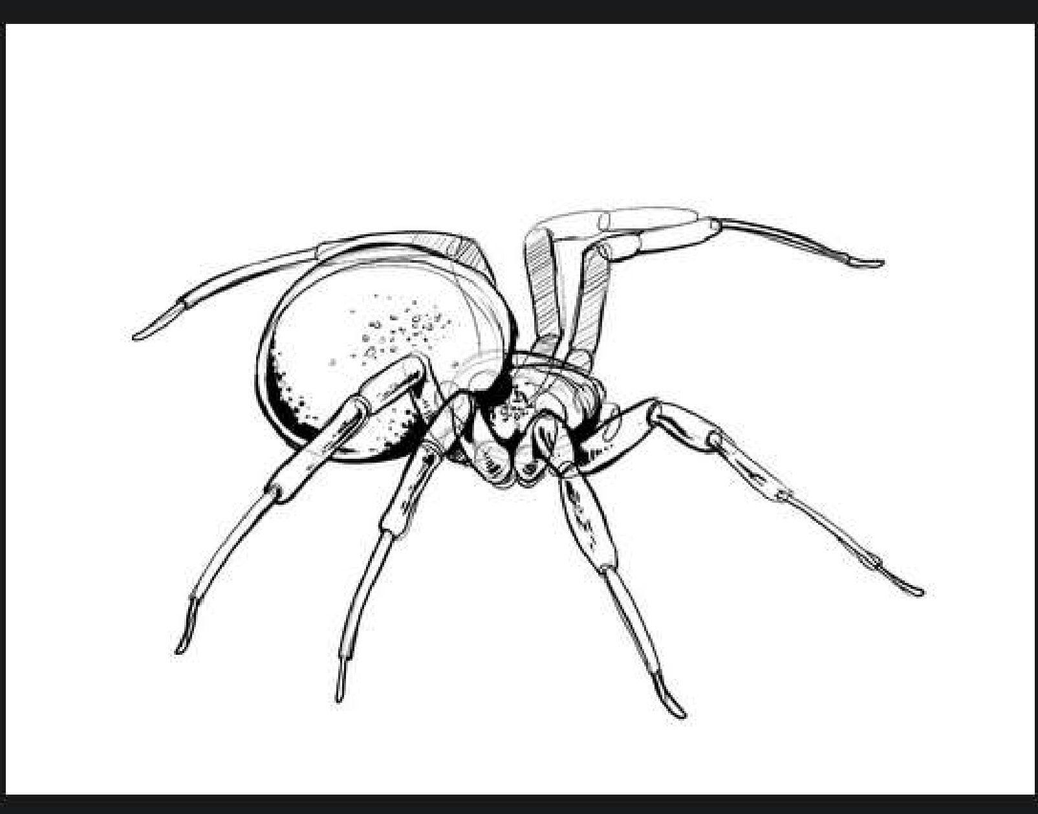
Next I want to try and find out roughly where and how the legs connect to the body. It can be helpful to look up other images of your subject matter, especially ones that show how the underside of its body is arranged.

It also helps to block in those joints (as circles) for the opposite side of the body as well, at least for the legs that are going to be visible. Of course, being on the opposite side of the body, we are likely going to take steps later to flatten them out and make them less dominant, but for now we want to make sure we can largely understand how the whole object exists in three dimensions.



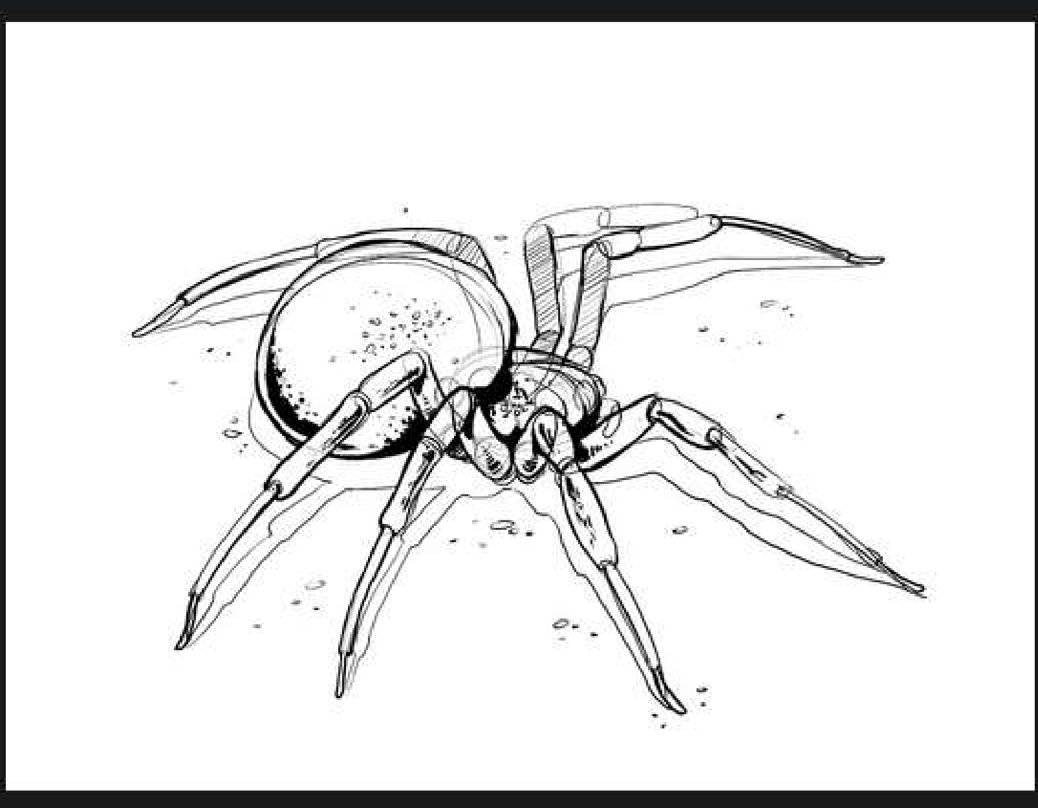
At first glance this may seem like a huge jump, but it's absolutely not. Each leg is segmented, and so while carefully observing my reference image, I built each segment out one at a time. I find the most success from drawing the same segment for all of the legs before moving onto the next, rather than building out each leg one at a time. This helps keep the arrangement balanced, rather than finding later on that you've accidentally run out of space to include the last leg in any reasonable way.

You will make mistakes in your arrangement of things, but at least this way you can compensate and shift things around together, evenly spreading out the impact of your blunder over all of the legs rather than having it focused on one.



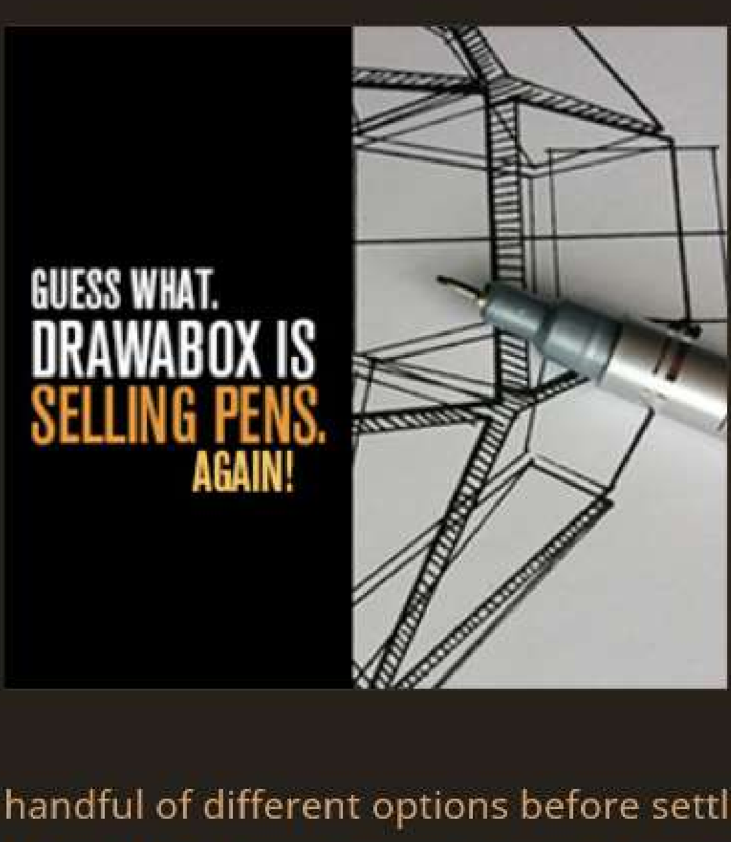
The most important thing I've done here is just adding line weight (and blacking out a few small sections to help clarify my leg-forms and reduce a lot of the clutter going on). At this stage in the drawing, you're going to have a lot of overlapping lines vying for your viewer's attention. You want to set these out in a sort of hierarchy of importance, so your viewer ultimately knows what to look at first. As we covered in the last lesson, your first tool for achieving this is simple line weight to clarify what exists in front of what. Second is filling in areas with solid black to help another area of white to really pop into view.

You'll also notice that for the back legs, I added some very simple, straight hatching. Straight hatching on a rounded object is usually a no-no, because it'll flatten your form out completely. In this case, that's what I want. It's a design choice to help push those legs back in terms of importance. I want the viewer's eye to glaze over those details in favour of the legs closer to them.



My last step is limited to just a few minor touches - adding a cast shadow (just a quick outline of the shape with no fill whatsoever) and little details to suggest what kind of ground this creature is resting upon. It's not that important, but it does help in terms of presentation to ground the object and offer hints regarding the world beyond this very focused snapshot.

<<< Video Demos
House Fly Demo >>>



Drawabox-Tested Fineliners (Pack of 10, $17.50 USD)

Let's be real here for a second: fineliners can get pricey. It varies from brand to brand, store to store, and country to country, but good fineliners like the Staedtler Pigment Liner (my personal brand favourite) can cost an arm and a leg. I remember finding them being sold individually at a Michael's for $4-$5 **each**. That's highway robbery right there.

Now, we're not a big company ourselves or anything, but we have been in a position to periodically import large batches of pens that we've sourced ourselves - using the wholesale route to keep costs down, and then to split the savings between getting pens to you for cheaper, and setting some aside to one day produce our own.

These pens are each hand-tested (on a little card we include in the package) to avoid sending out any duds (another problem with pens sold in stores). We also checked out a handful of different options before settling on this supplier - mainly looking for pens that were as close to the Staedtler Pigment Liner. If I'm being honest, I think these might even perform a little better, at least for our use case in this course.

We've also tested their longevity. We've found that if we're reasonably gentle with them, we can get through all of Lesson 1, and halfway through the box challenge. We actually had ScyllaStew test them while recording realtime videos of her working through the lesson work, which you can check out here, along with a variety of reviews of other brands.

Now, I will say this - we're only really in a position to make this an attractive offer for those in the continental United States (where we can offer shipping for free). We *do* ship internationally, but between the shipping prices and shipping times, it's probably not the best offer you can find - though this may depend. We also straight up can't ship to the UK, thanks to some fairly new restrictions they've put into place relating to their Brexit transition. I know that's a bummer - I'm Canadian myself - but hopefully one day we can expand things more meaningfully to the rest of the world.

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Lesson 4: Applying Construction to Insects and Arachnids

House Fly Demo

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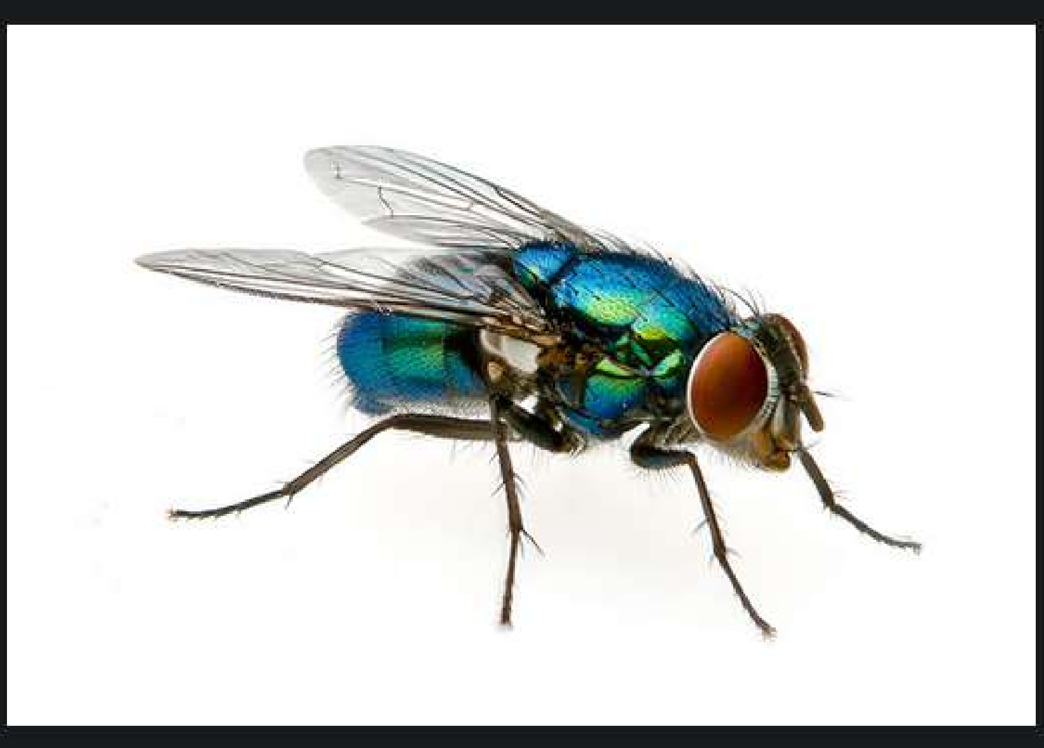
Demo video

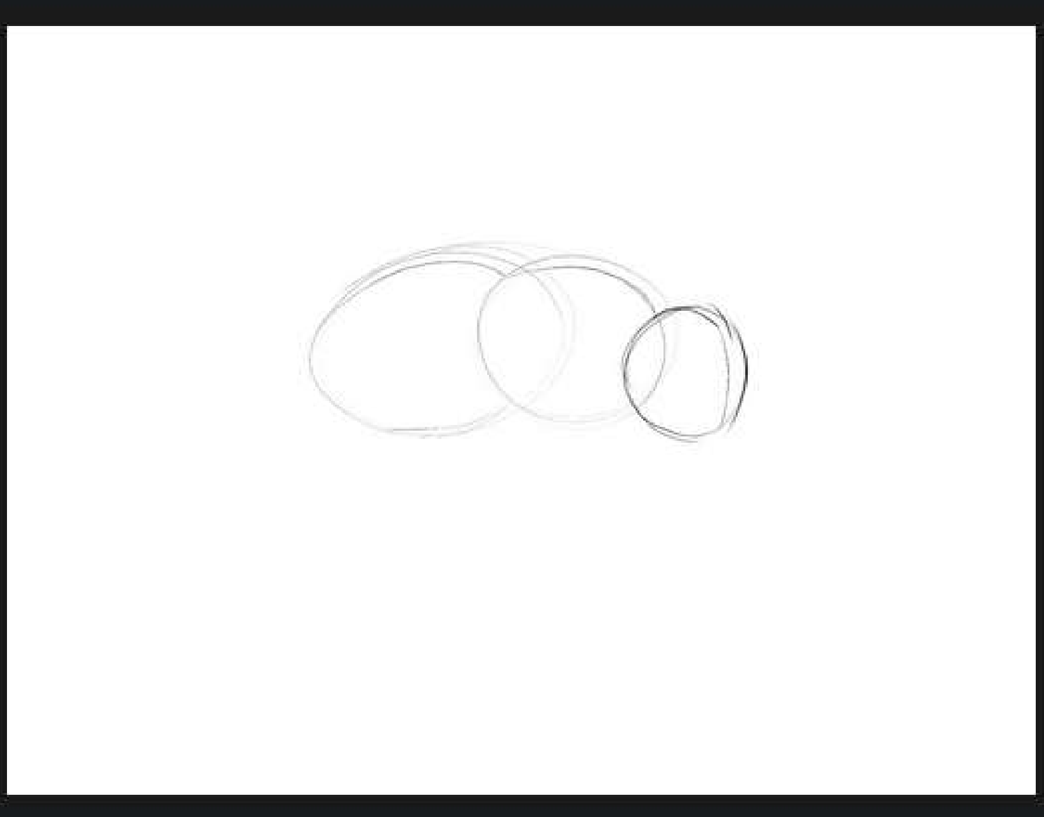
This time let's tackle a pretty common insect that has a clear head/thorax/abdomen configuration.

This recording has no accompanying audio commentary.



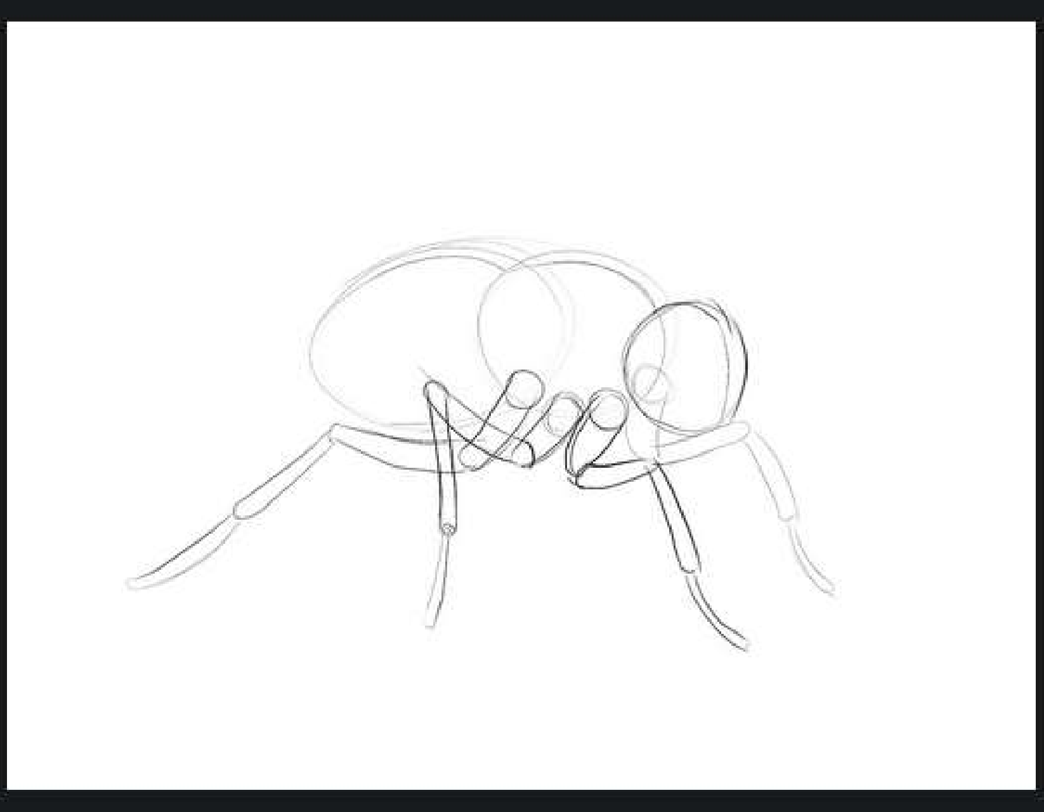
Reference

Here's the reference image I'm using for this demo. As always, try and find something with a good, high resolution. When things get blurry, it can become quite difficult to discern important information.

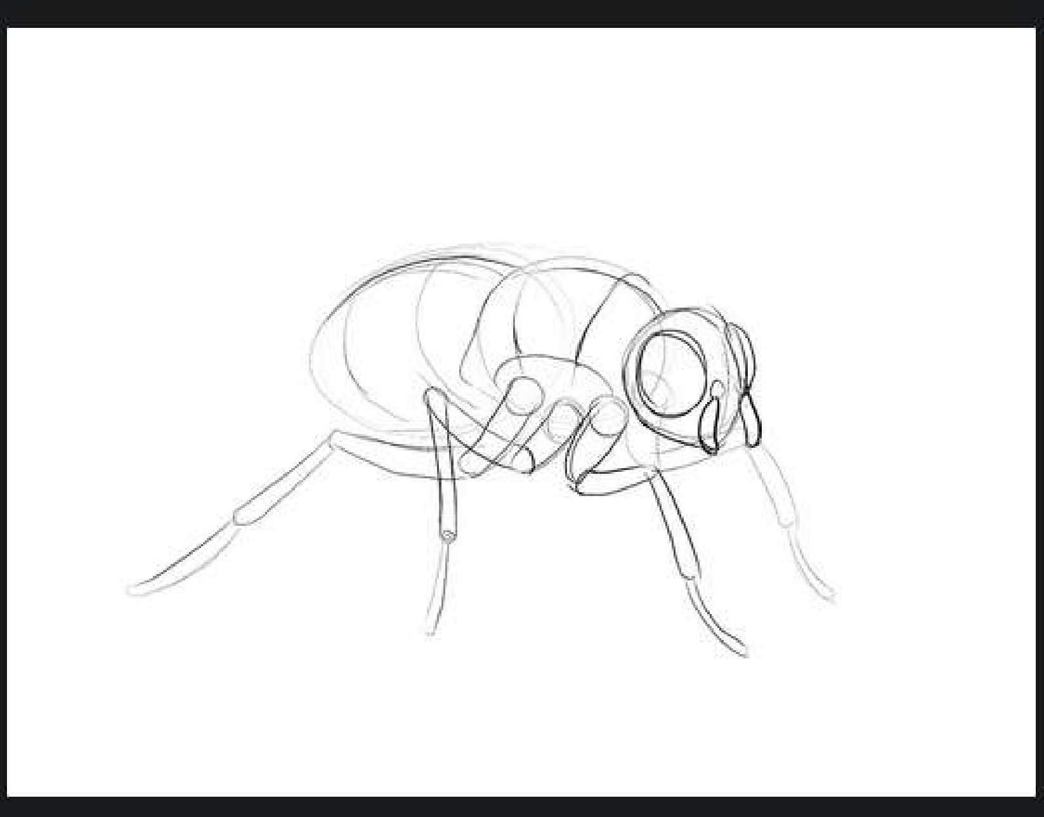


Step by step

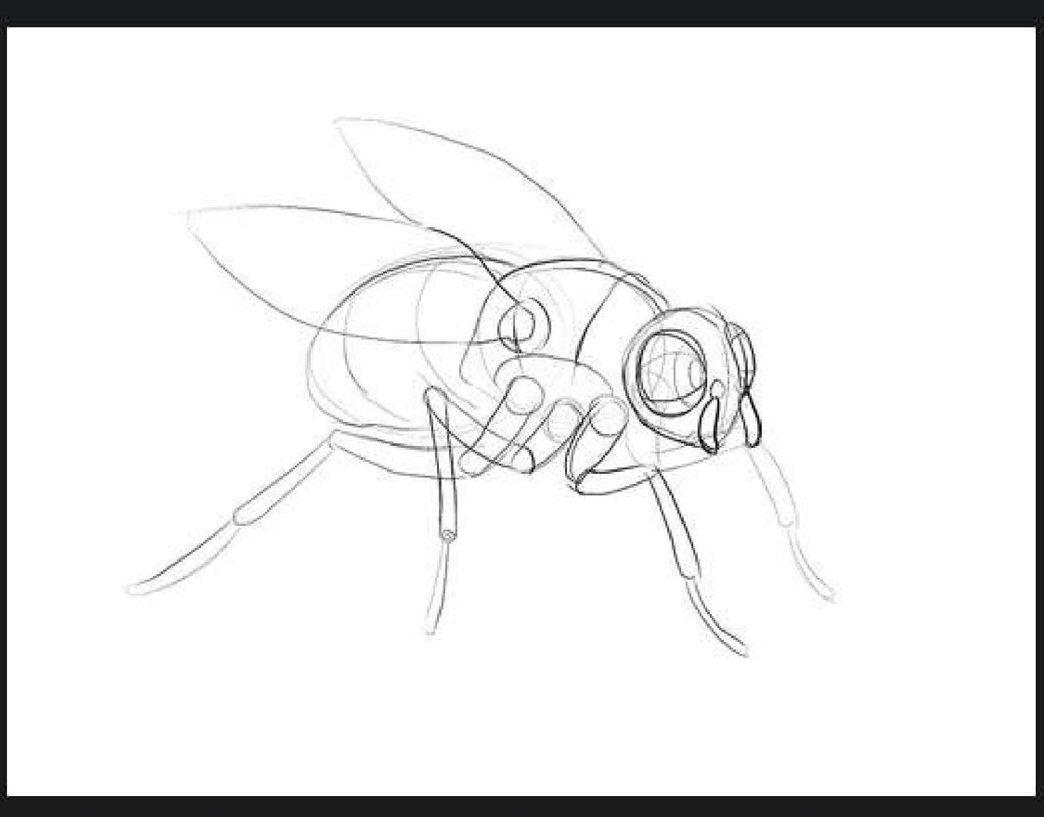
Start off by fleshing out your major forms - head, thorax, abdomen.



With your major forms laid out, you next want to add in some legs. In the reference image, we can't see where the legs attach to the body, so with some additional research and a bit of critical thinking, you'll find that they connect underneath the thorax like every other insect and arachnid we've dealt with today. Remember that insects have three pairs of legs, and pay special attention to how they spread out from the body. The front pair always faces forwards, but the other pairs tend to point more towards the back.

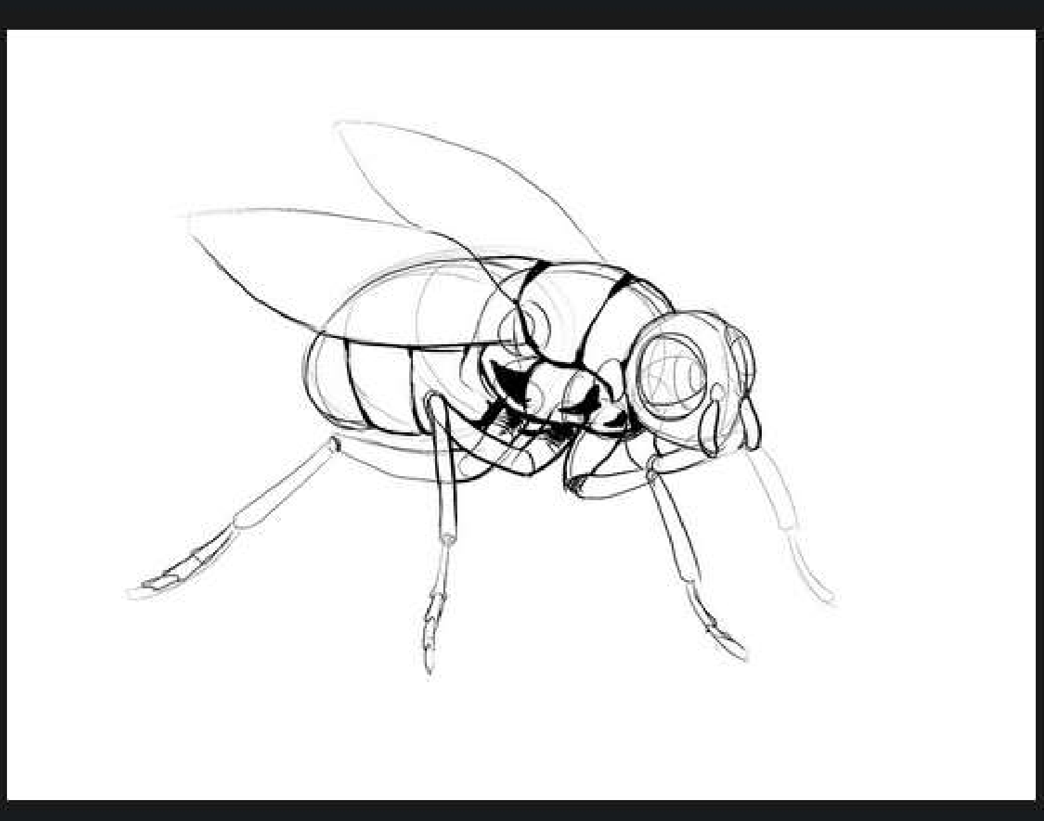


Here I've added some contour curves to help reinforce my more ball-like forms, and I've started breaking down the more complex elements of the head.

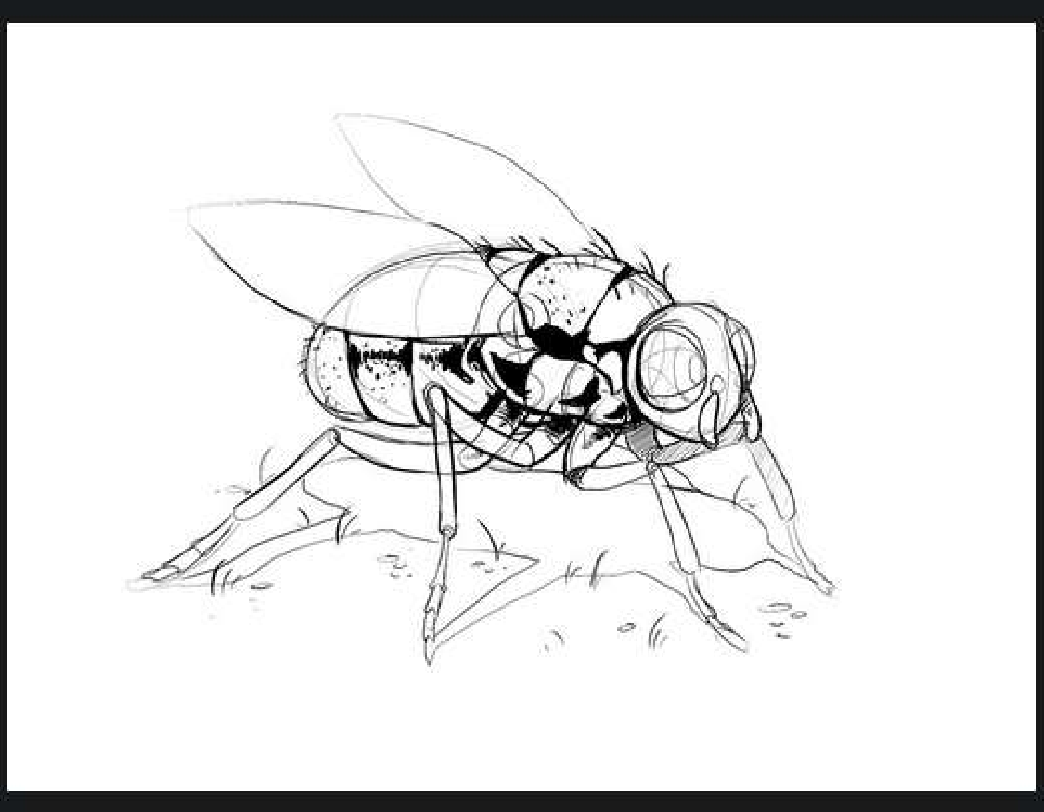


When drawing wings, don't just tack them on thoughtlessly. Consider how they attach to the body. The more accurately and thoughtfully you deal with these problems of connectivity, the more believable and solid your drawing will appear at the end.

Think of every object in existence as series of problems, whose design was tailored (be it through craftsmanship, evolution or whatever else) to solve these problems. In this case, how do we attach these wings to this little bastard so he can fly around and buzz in everyone's faces while they're trying to work.



Now that the construction is done, all that's left is to sort through the mess, bring the important shapes and lines to the forefront and push the others back. As always, use line weight to clarify which forms and shapes are in front, and which ones are behind.



Same as all of the other demos - add a quick cast shadow that roughly matches the object and throw in some appropriate ground details. In this case, I was actually thinking about little bits of human hair and skin, but it looks a lot more like grass and dirt. That's definitely something to keep in mind - if that reads as grass, it tells the viewer that this fly is massive and that they should run away immediately. Or that they should try to saddle it and use it as a steed... Either way, not what I was after.

<<< Black Widow Demo

Informal Demos >>>

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The Art of Blizzard Entertainment

While I have a massive library of non-instructional art books I've collected over the years, there's only a handful that are actually important to me. This is one of them - so much so that I jammed my copy into my overstuffed backpack when flying back from my parents' house just so I could have it at my apartment. My back's been sore for a week.

The reason I hold this book in such high esteem is because of how it puts the relatively new field of game art into perspective, showing how concept art really just started off as crude sketches intended to communicate ideas to storytellers, designers and 3D modelers. How all of this focus on beautiful illustrations is really secondary to the core of a concept artist's job. A real eye-opener.

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- Additive construction and using silhouettes
- Layered segmentation
- Cricket's abdominal segmentation
- Spider construction
- Ladybug construction
- The turning of form
- Identifying texture

Lesson 4: Applying Construction to Insects and Arachnids

Informal Demos

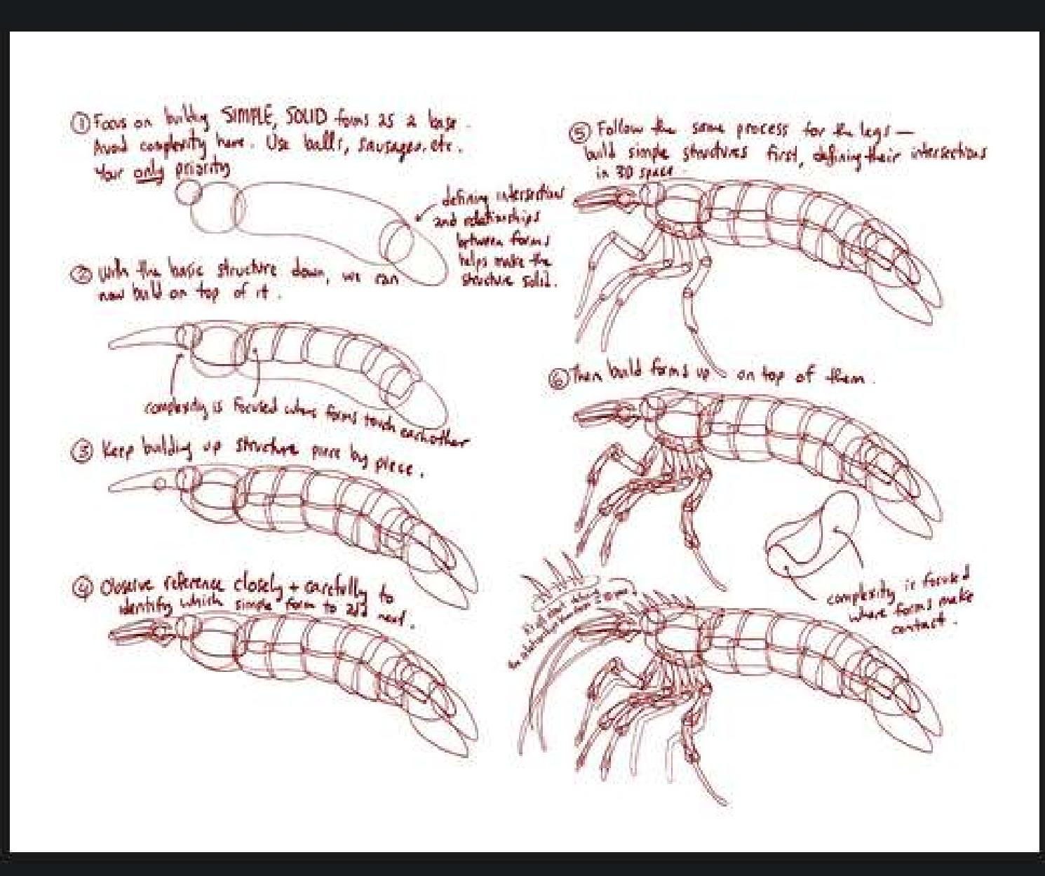
Hate to read? No problem. **We can read the text to you.**

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

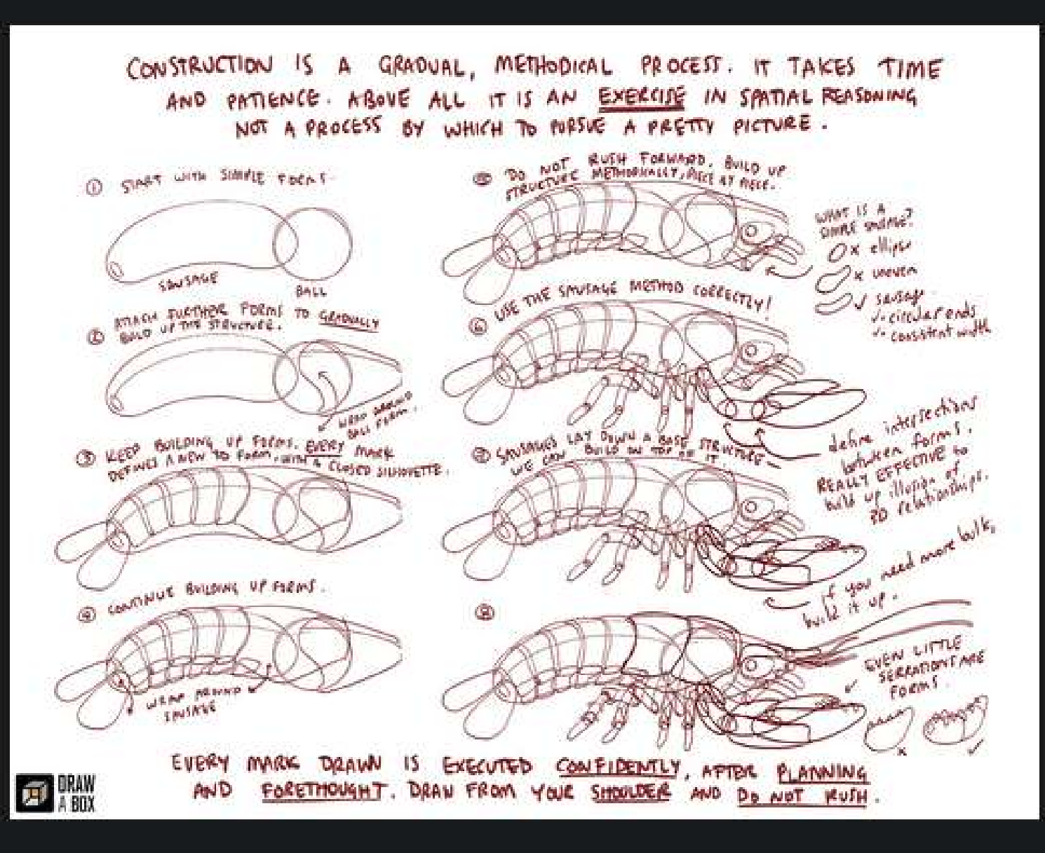
LISTEN WITH DRAWABOX

The demos here have been drawn in the course of a student's homework critique, but contain information that can be useful to all working through this material.


① Focus on building SIMPLE, SOLID forms as a base. Avoid complexity here. Use balls, sausages, etc. Your only priority
② With the basic structure down, we can now build on top of it.
defining intersections and relationships between forms helps make the structure solid.
complexity is focused where forms touch eachother
③ Keep building up structure piece by piece.
④ Observe reference closely + carefully to identify which simple form to add next.
⑤ Follow the same process for the legs — build simple structures first, defining their intersections in 3D space
⑥ Then build forms up on top of them.
complexity is focused where forms make contact.

Shrimp construction

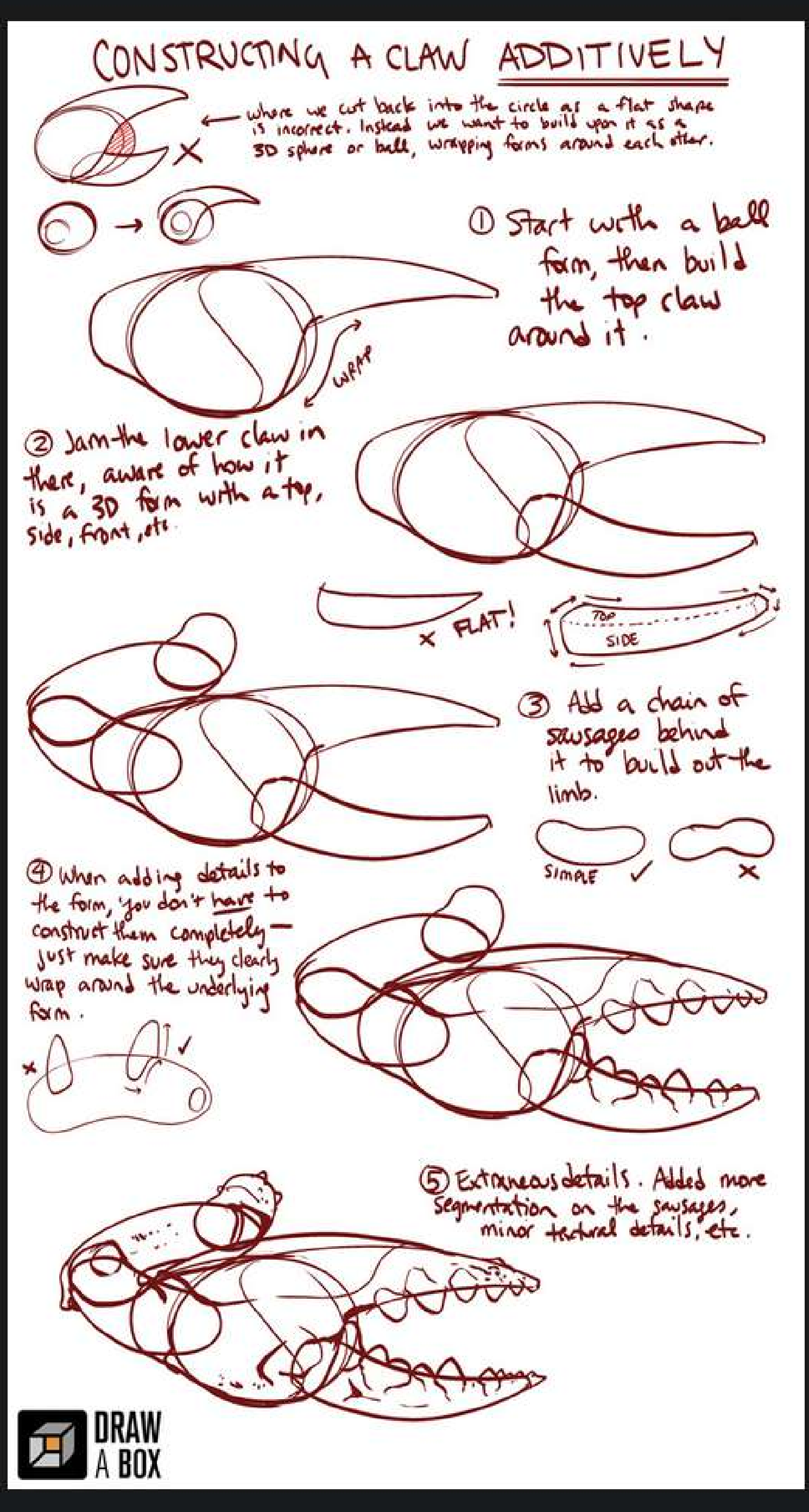
Sticking to the trend of looking at more crustaceans, this is a demo I did for a student. It's based on a mixture of the student's own drawing and some other reference images, so I'm not sure if it's actually all that accurate to real shrimp - but the focus here is ultimately on how we can take simple forms and combine them, defining how they relate and intersect in 3D space, and building upon them in much the same way to work towards an overall more complex result.


EVERY MARK DRAWN IS EXECUTED CONFIDENTLY, AFTER PLANNING AND FORETHOUGHT. DRAW FROM YOUR SHOULDER AND DO NOT RUSH.
DRAW A BOX

Lobster construction

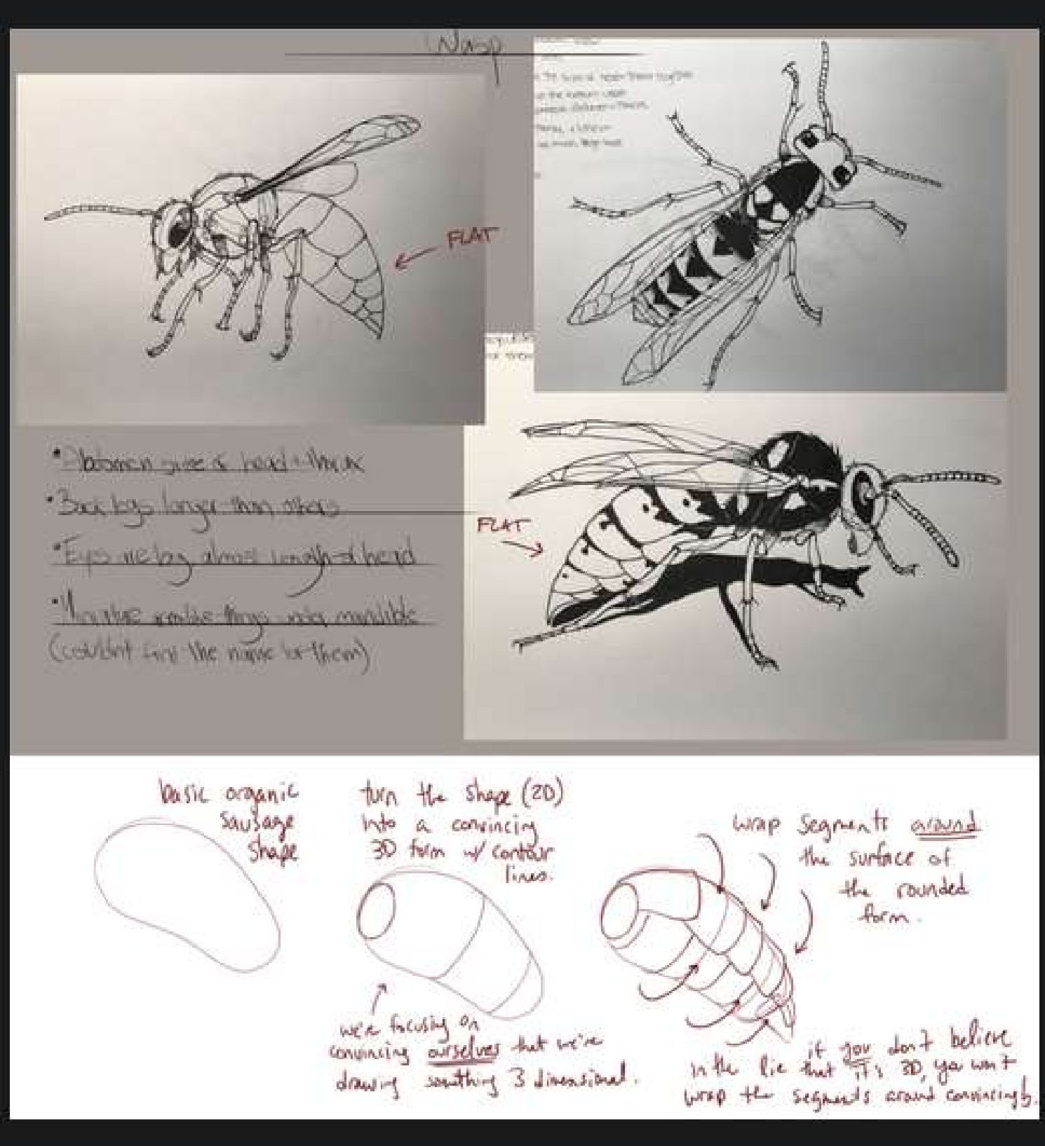
Here's a demonstration of using a lobster as the focus of a constructional exercise. Always remember - constructional drawing, and everything we do within this course, is just an exercise.

Furthermore, it is an exercise that requires immense patience and care. Students are often eager to rush forwards and to skip steps. Everything builds upon the structure laid down before it, and if there is not enough to support the complexity you wish to add, your construction will fall flat.


CONSTRUCTING A CLAW ADDITIVELY
where we cut back into the circle as a flat shape is incorrect. Instead we want to build upon it as a 3D sphere or ball, wrapping forms around each other.
① Start with a ball form, then build the top claw around it.
WRAP
② Jam the lower claw in there, aware of how it is a 3D form with a top, side, front, etc.
FLAT!
TOP
SIDE
③ Add a chain of sausages behind it to build out the limb.
SIMPLE
④ When adding details to the form, you don't have to construct them completely — just make sure they clearly wrap around the underlying form.
⑤ Extraneous details. Added more segmentation on the sausages, minor textural details, etc.
DRAW A BOX

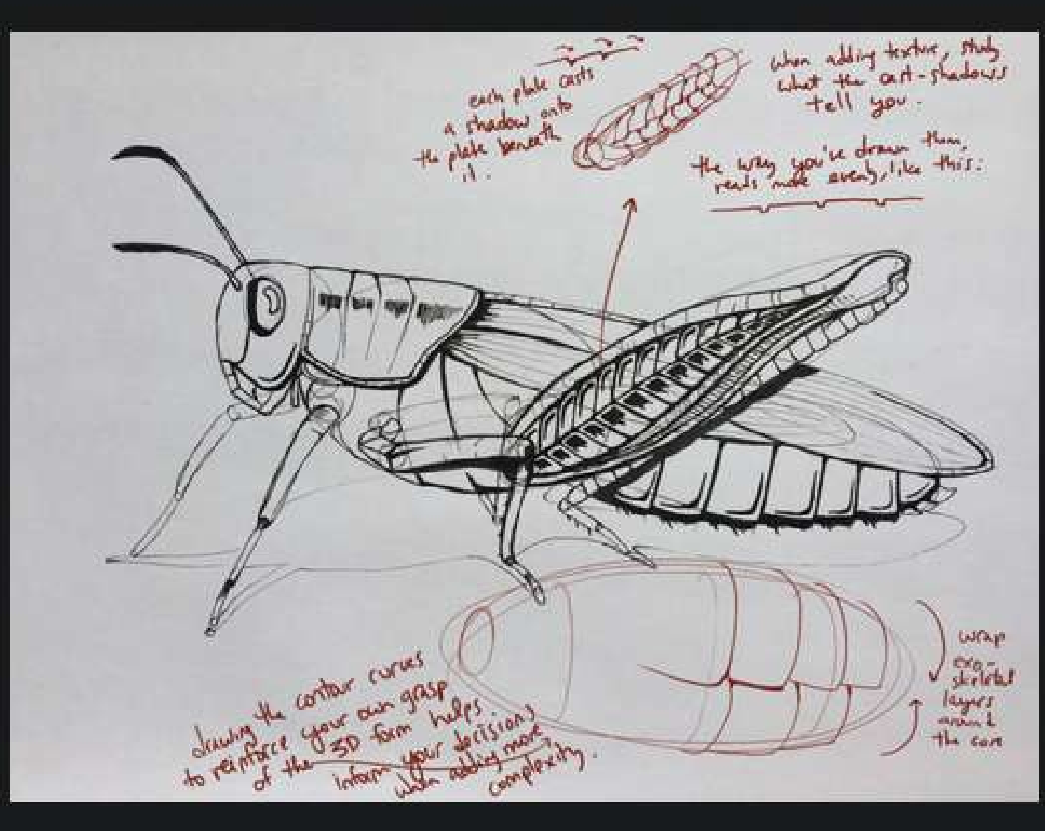
Additive construction and using silhouettes

This demo focuses on how to apply additive construction (as opposed to using subtractive construction incorrectly by focusing on flat shapes rather than solid 3D forms). It also explores how you can imply the presence of top/side/front faces of an object through silhouette alone, and also how you can use that silhouette to demonstrate how one form wraps around one it is connected to, without the use of any internal edges being defined.



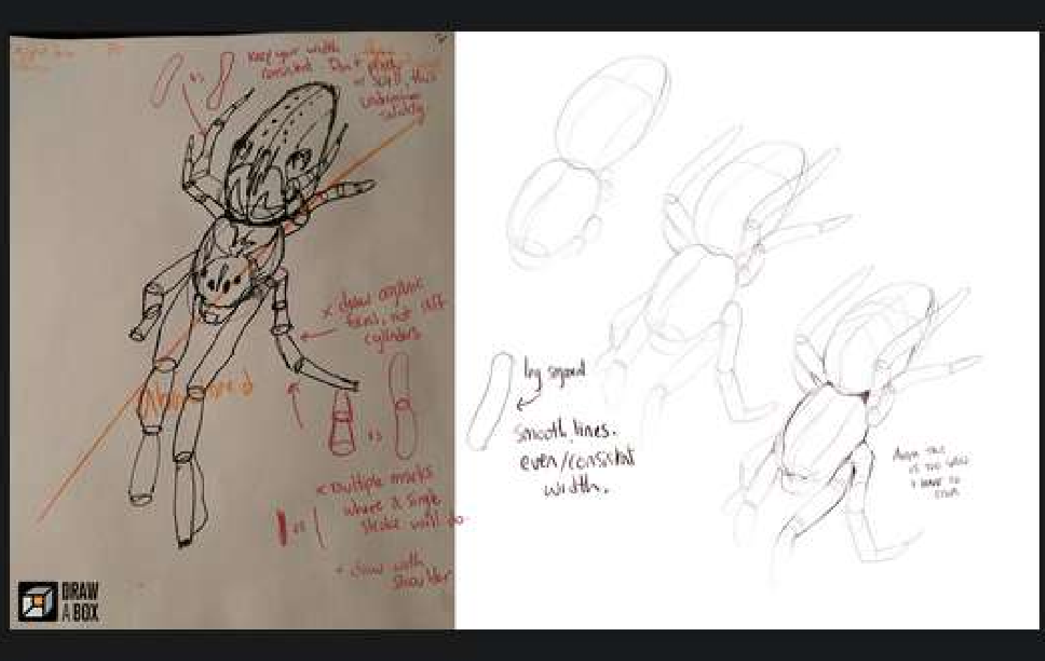
Layered segmentation

A lot of these insects feature various kinds of segmentation, especially on their abdomens. Pay close attention to how they overlap, and how they break the silhouette of the form in order to convey them as strongly and effectively as you can.



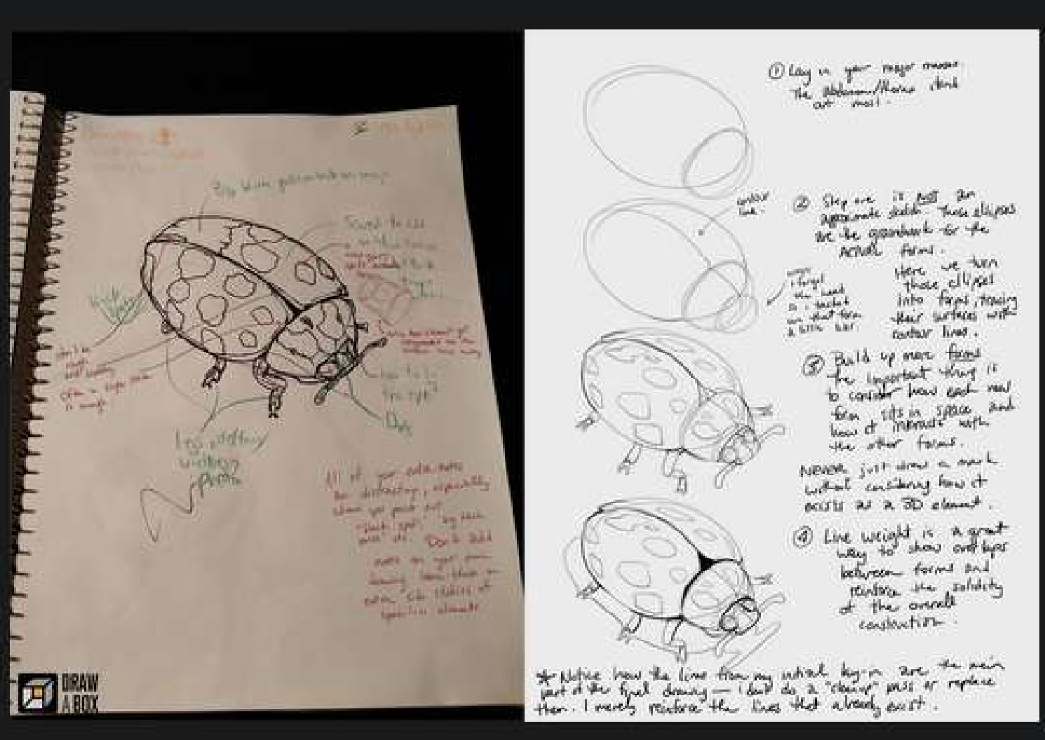
Cricket's abdominal segmentation

I often find that students have a tendency to flatten out crickets' abdomens, even when they do a great job with segmentation on other insects. Something about their bodies really lends themselves to it. Always think about how those layered segments of chitin conform around the underlying bodypart.



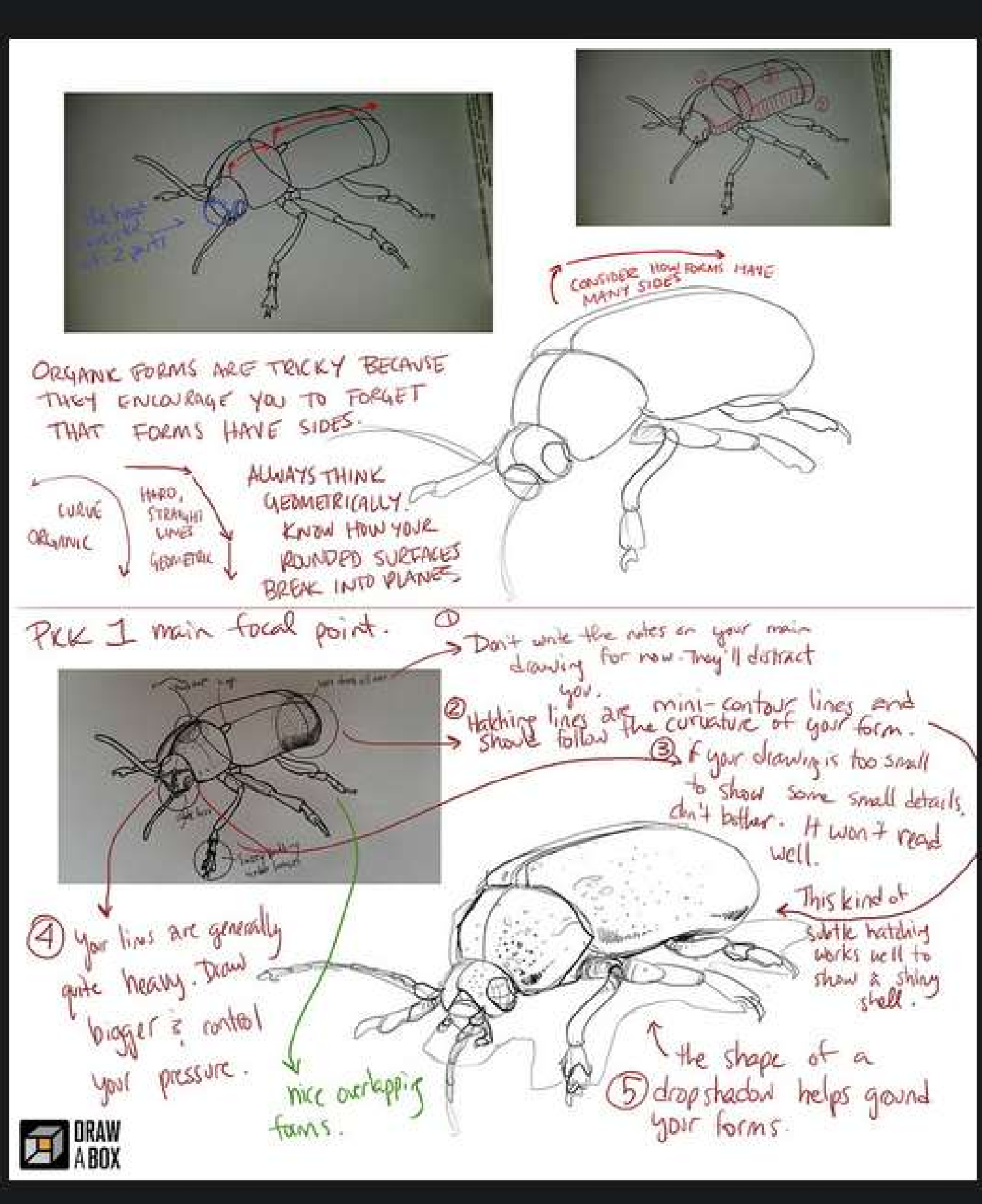
Spider construction

Simple overview of how I would have approached this spider. I don't believe I had the reference for this one, so I constructed it based on what the student's drawing conveyed.



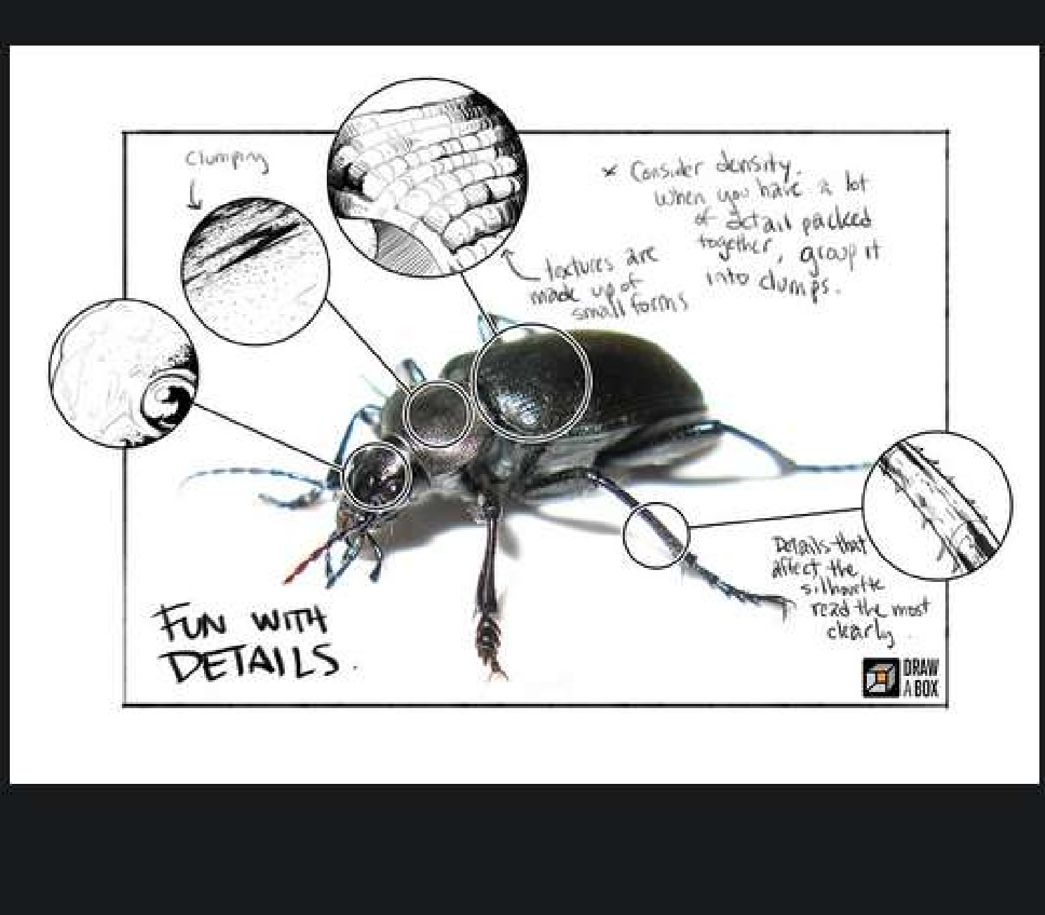
Ladybug construction

Same as the above - using the student's drawing, I broke it down into its major forms and explained how I would have approached the construction.



The turning of form

One thing we get into more and more as we talk about construction and form is the idea of forms having clear distinctions between their various faces. The top, the side, the front, etc. Even when a form has a seemingly smooth transition here, think about where you would distinguish these planes, and where the surfaces turn.


FUN WITH DETAILS.
Details that affect the silhouette read the most clearly
DRAW A BOX

Identifying texture

While many students will drop in some hatching lines and call it done, I want to encourage you to look a lot closer at your reference image and identify the wealth of visual elements and information that are being conveyed there. Look closely, and you'll find that it's not quite as simple as you may have thought.

<<< House Fly Demo

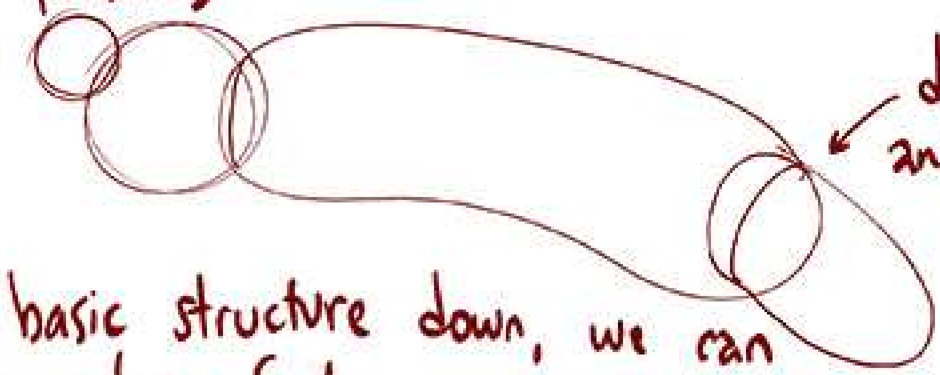
Applying Construction to Animals >>>

Sakura Pigma Microns

A lot of my students use these. The last time I used them was when I was in high school, and at the time I felt that they dried out pretty quickly, though I may have simply been mishandling them. As with all pens, make sure you're capping them when they're not in use, and try not to apply too much pressure. You really only need to be touching the page, not mashing your pen into it.

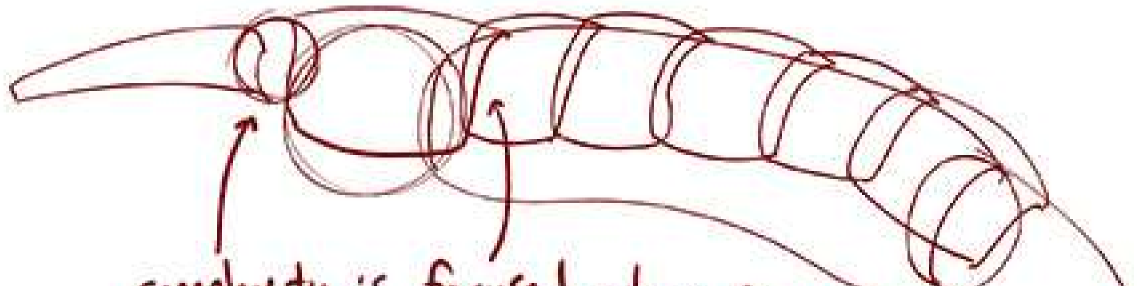
In terms of line weight, the sizes are pretty weird. 08 corresponds to 0.5mm, which is what I recommend for the drawabox lessons, whereas 05 corresponds to 0.45mm, which is pretty close and can also be used.

① Focus on building SIMPLE, SOLID forms as a base. Avoid complexity here. Use balls, sausages, etc. Your only priority



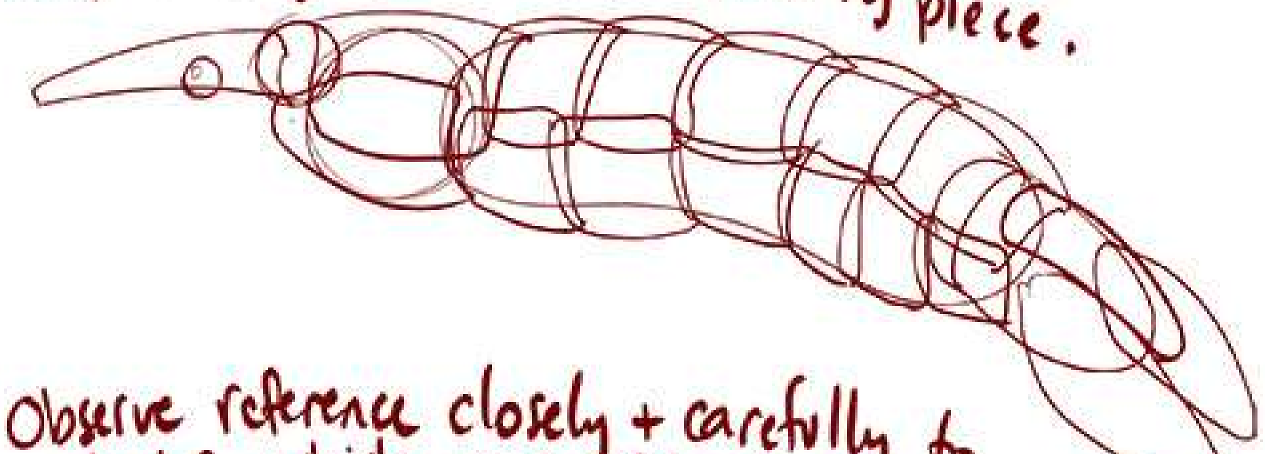
defining intersections and relationships between forms helps make the structure solid.

② With the basic structure down, we can now build on top of it.

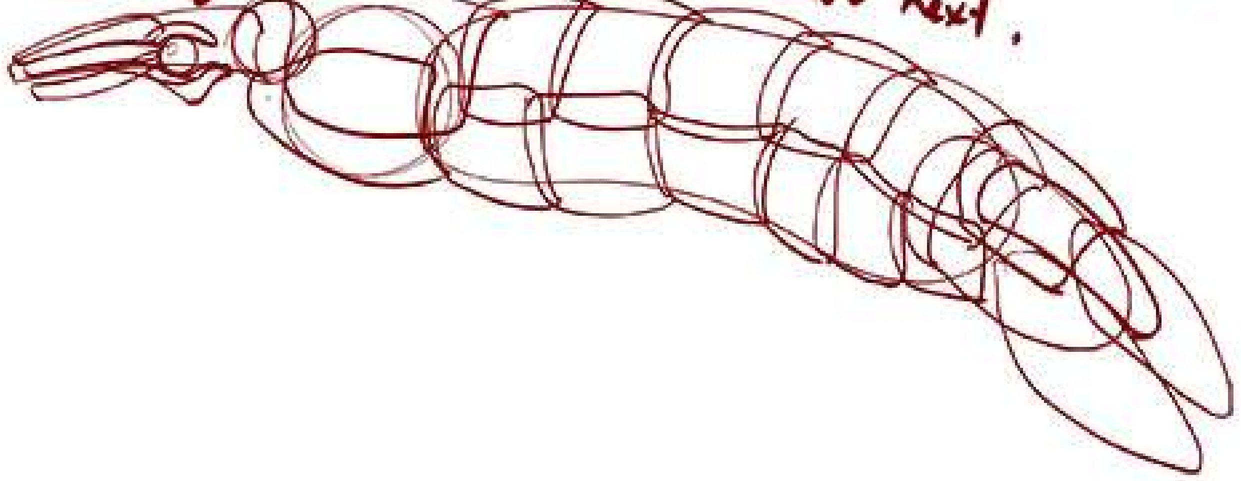


complexity is focused where forms touch eachother

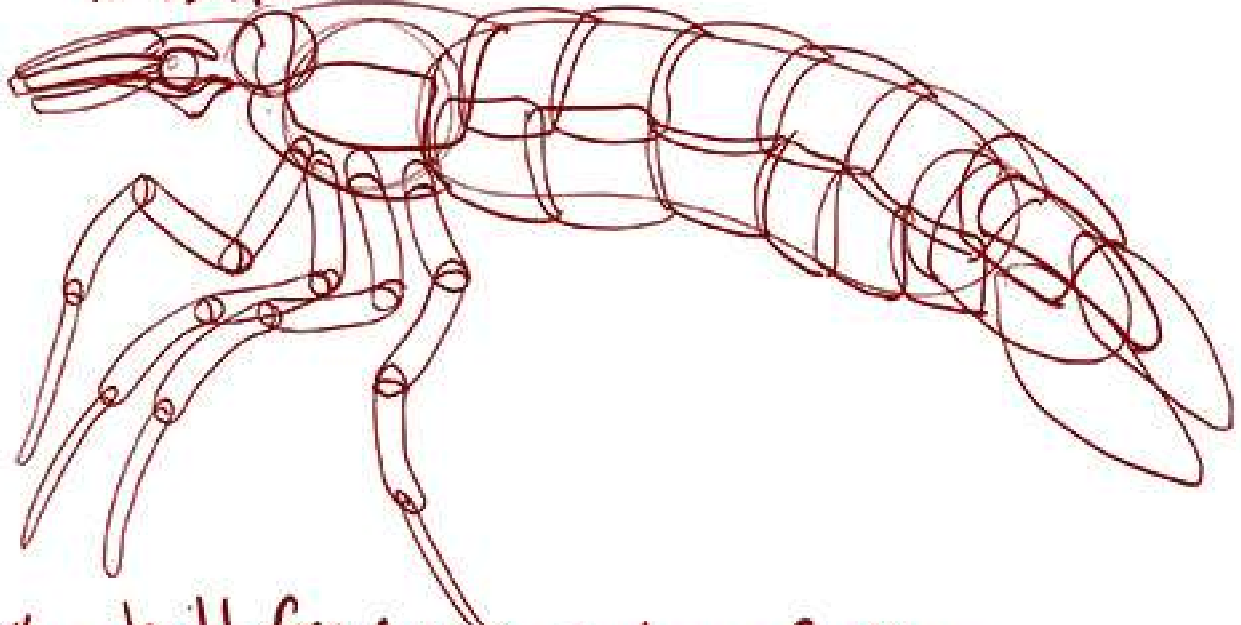
③ Keep building up structure piece by piece.



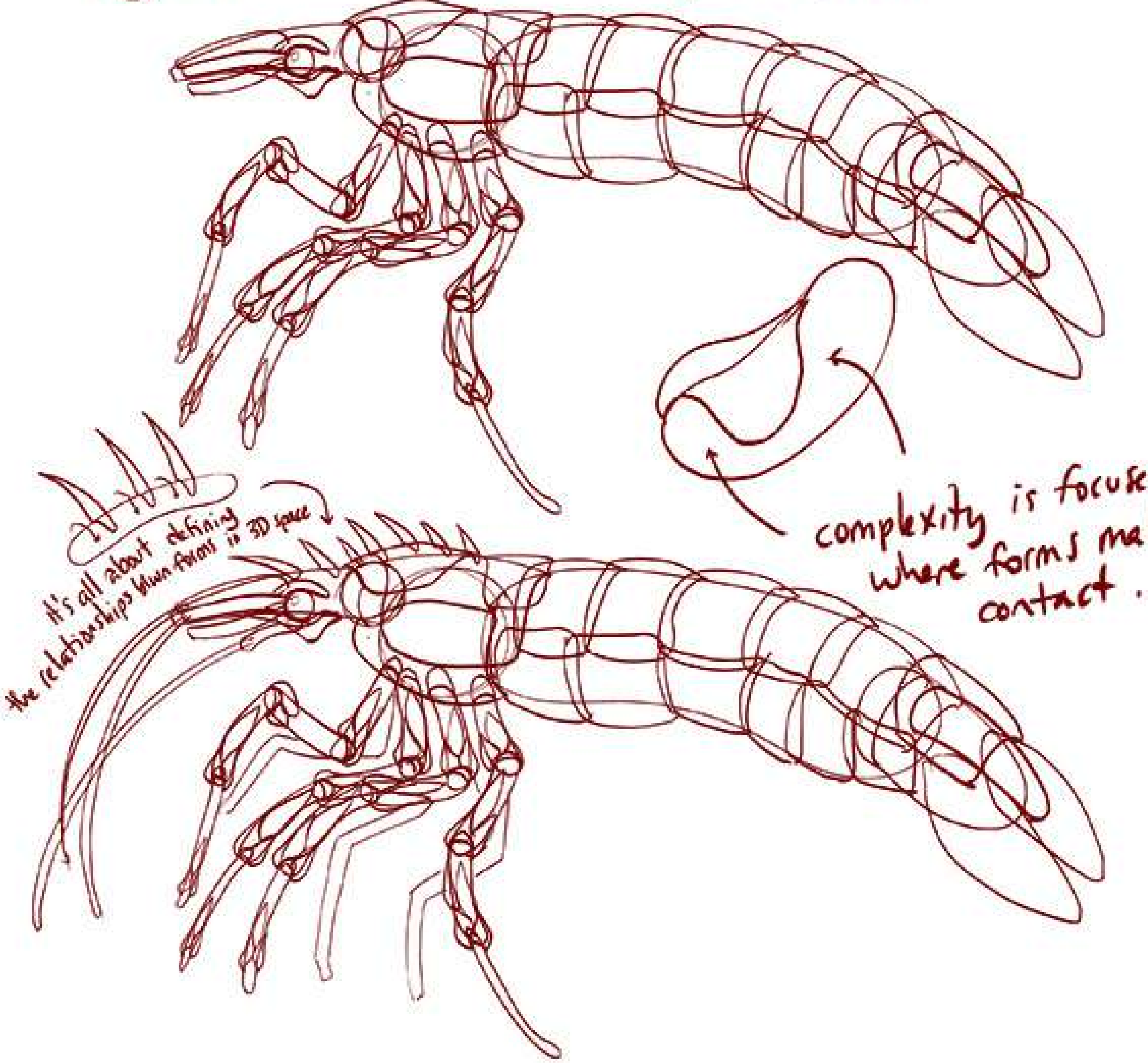
④ Observe reference closely + carefully to identify which simple form to add next.



⑤ Follow the same process for the legs— build simple structures first, defining their intersections in 3D space.



⑥ Then build forms up on top of them.

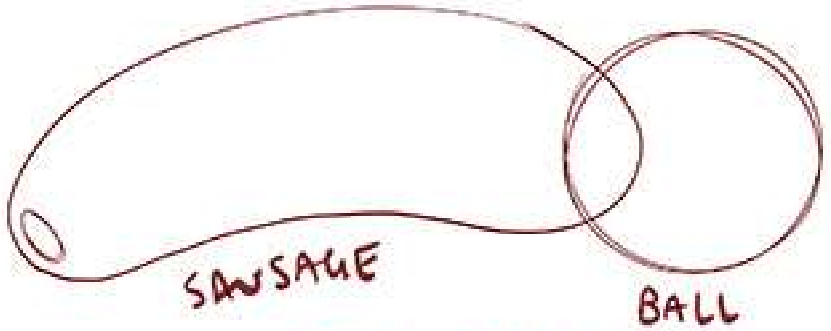


complexity is focused where forms make contact.

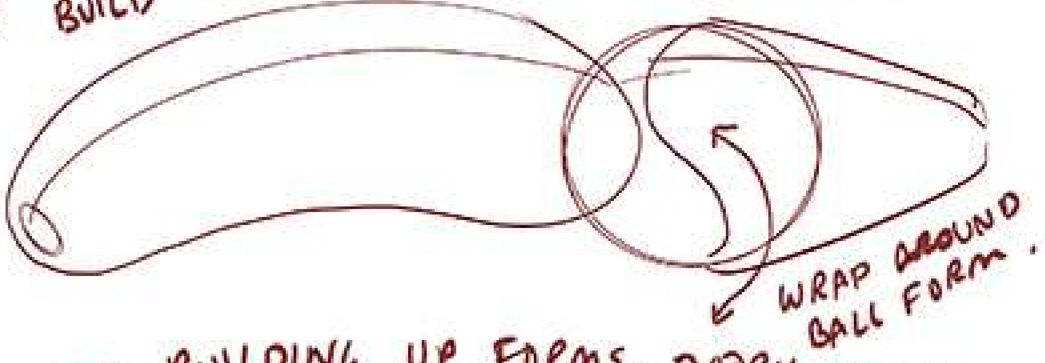
It's all about defining the relationships btwn forms in 3D space

CONSTRUCTION IS A GRADUAL, METHODICAL PROCESS. IT TAKES TIME AND PATIENCE. ABOVE ALL IT IS AN EXERCISE IN SPATIAL REASONING NOT A PROCESS BY WHICH TO PURSUE A PRETTY PICTURE.

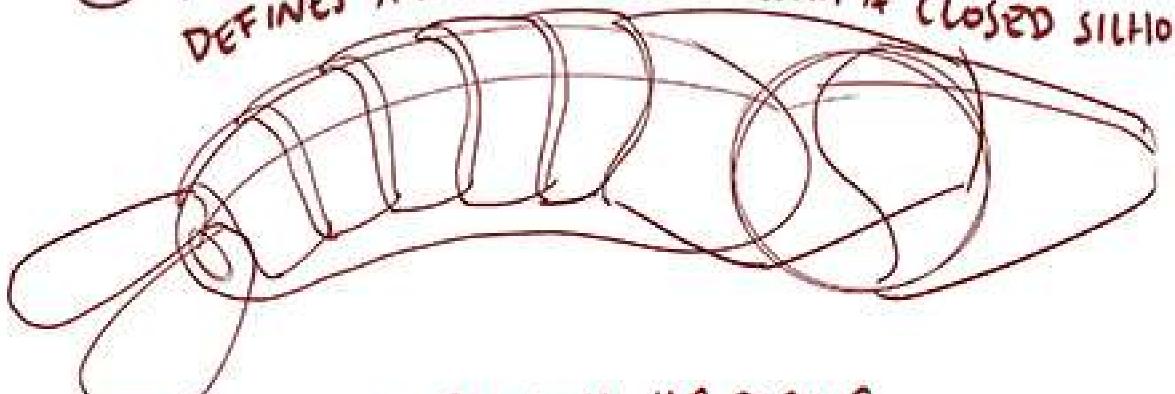
① START WITH SIMPLE FORMS.



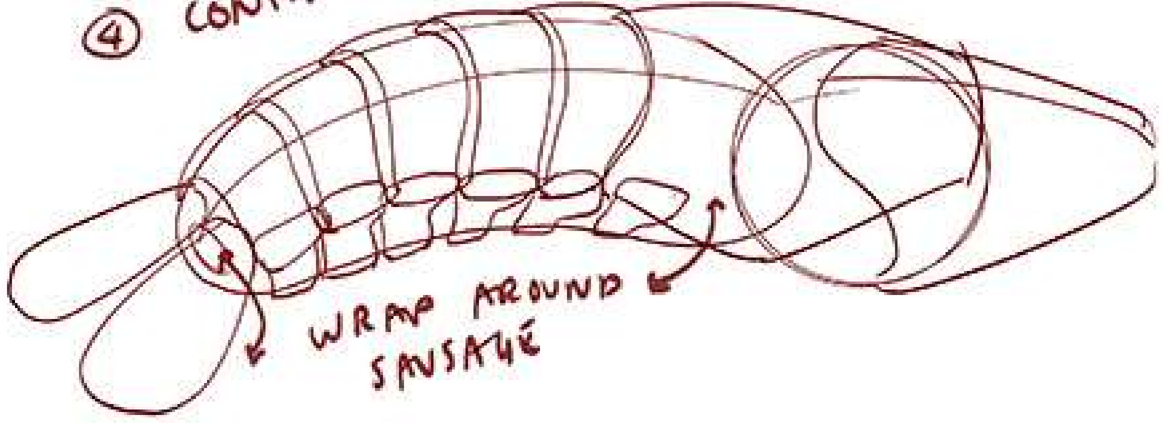
② ATTACH FURTHER FORMS TO GRADUALLY BUILD UP THE STRUCTURE.


WRAP AROUND BALL FORM.

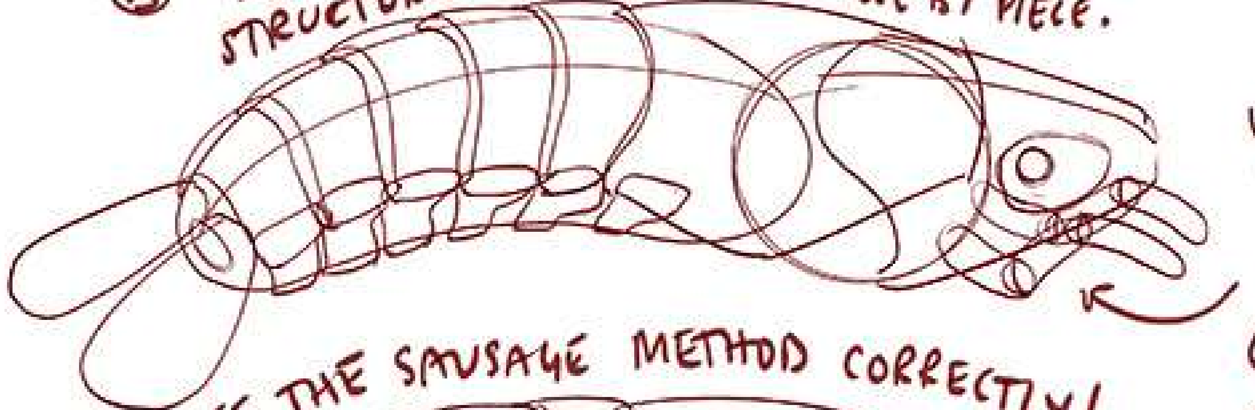
③ KEEP BUILDING UP FORMS. EVERY MARK DEFINES A NEW 3D FORM, WITH A CLOSED SILHOUETTE.



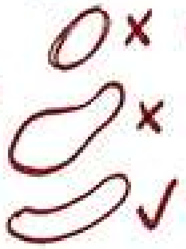
④ CONTINUE BUILDING UP FORMS.



⑤ DO NOT RUSH FORWARD. BUILD UP STRUCTURE METHODICALLY, PIECE BY PIECE.



WHAT IS A SIMPLE SAUSAGE?



× ellipse

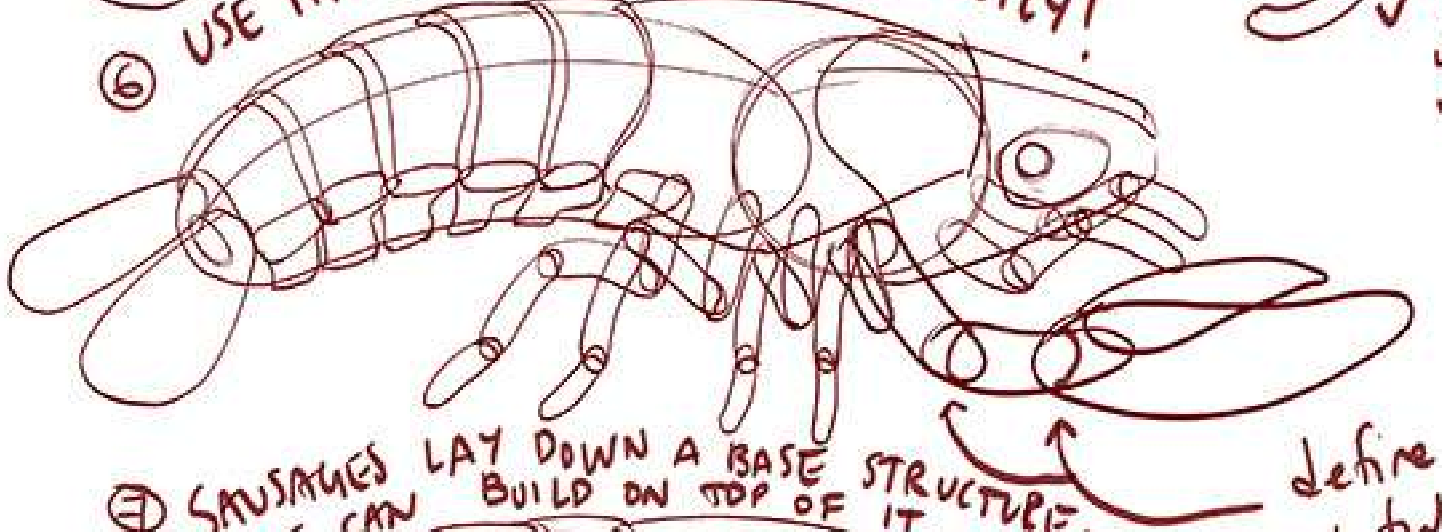
× uneven

✓ sausage.

✓• circular ends

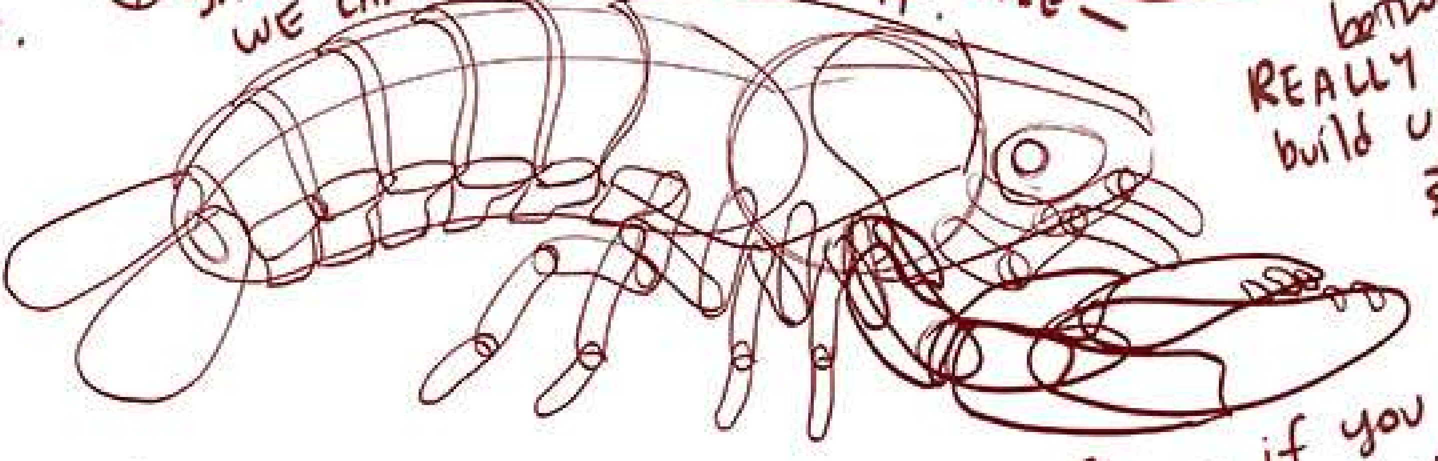
✓• consistent width

⑥ USE THE SAUSAGE METHOD CORRECTLY!



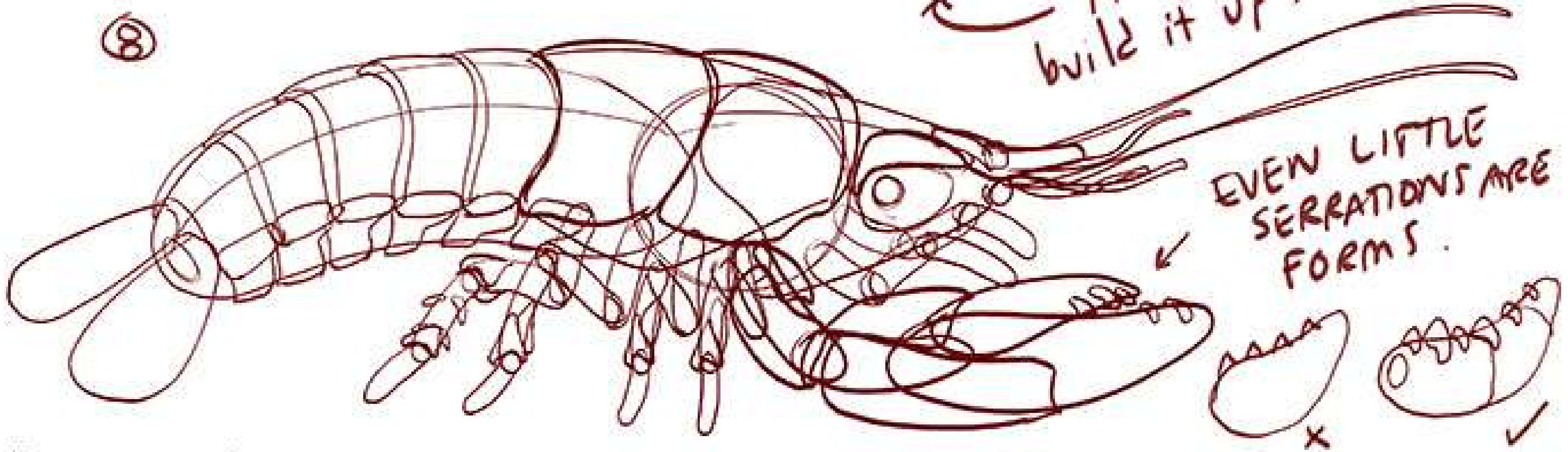
define intersections between forms. REALLY EFFECTIVE to build up illusion of 3D relationships.

⑦ SAUSAGES LAY DOWN A BASE STRUCTURE — WE CAN BUILD ON TOP OF IT.



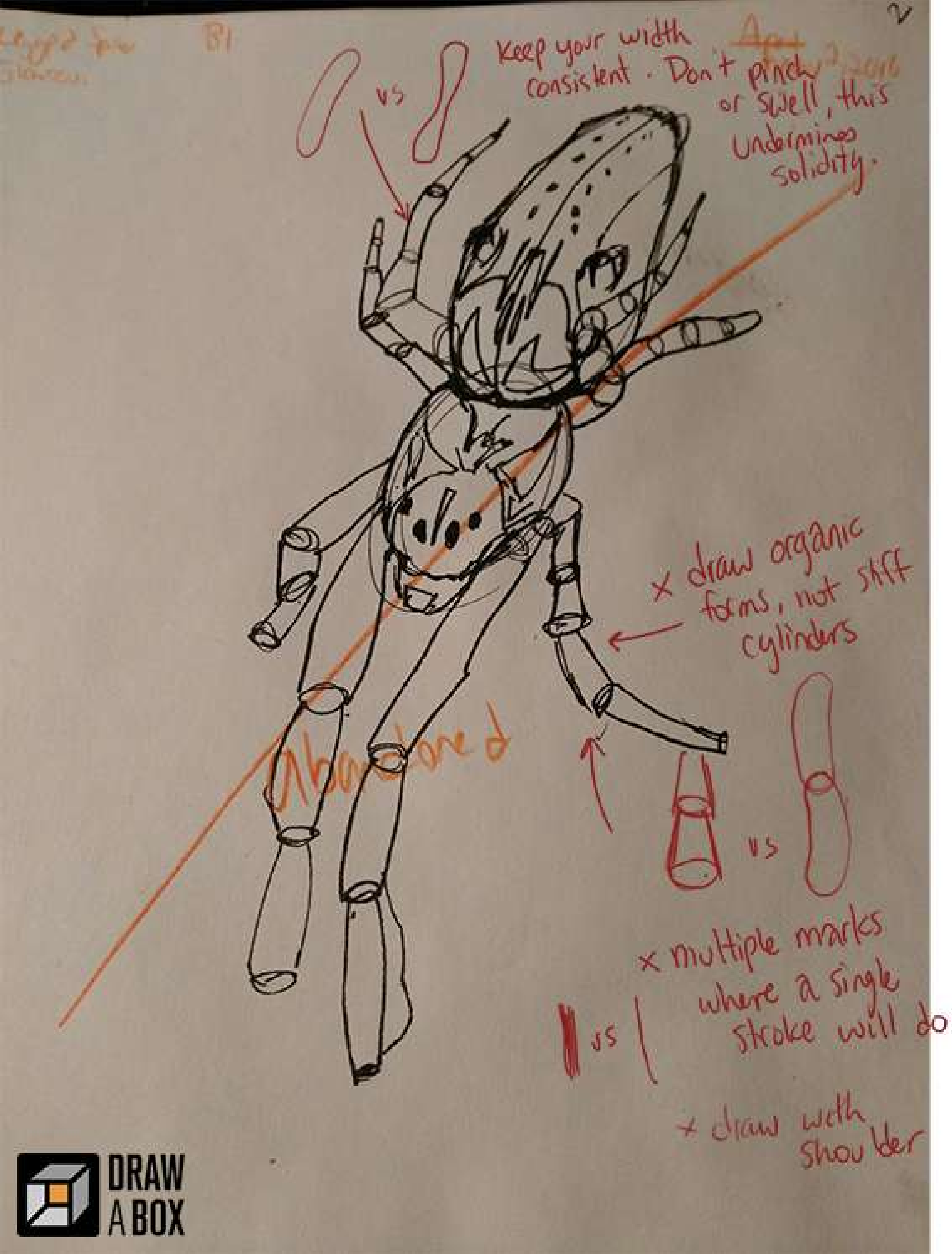
if you need more bulk, build it up.

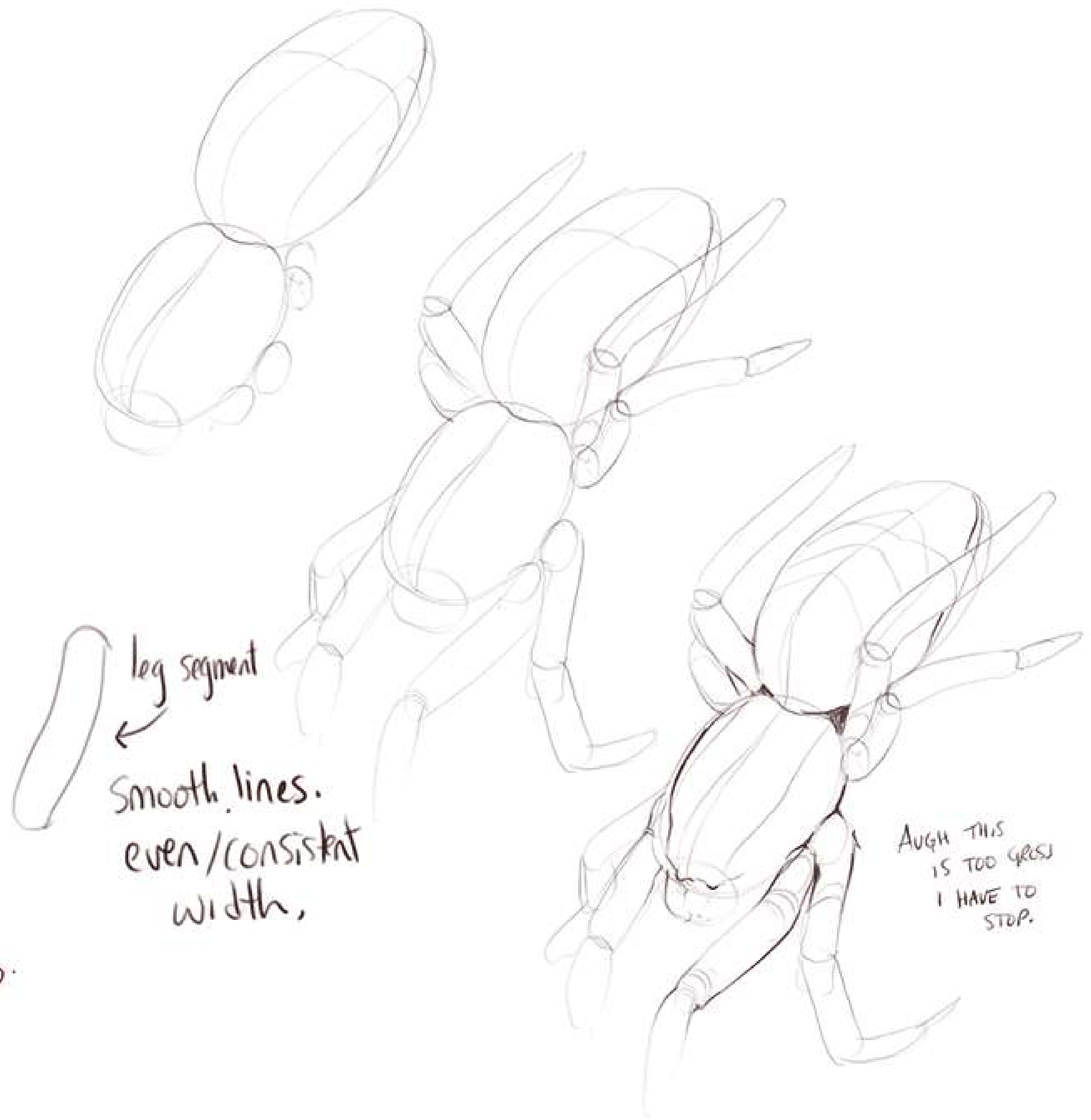
⑧

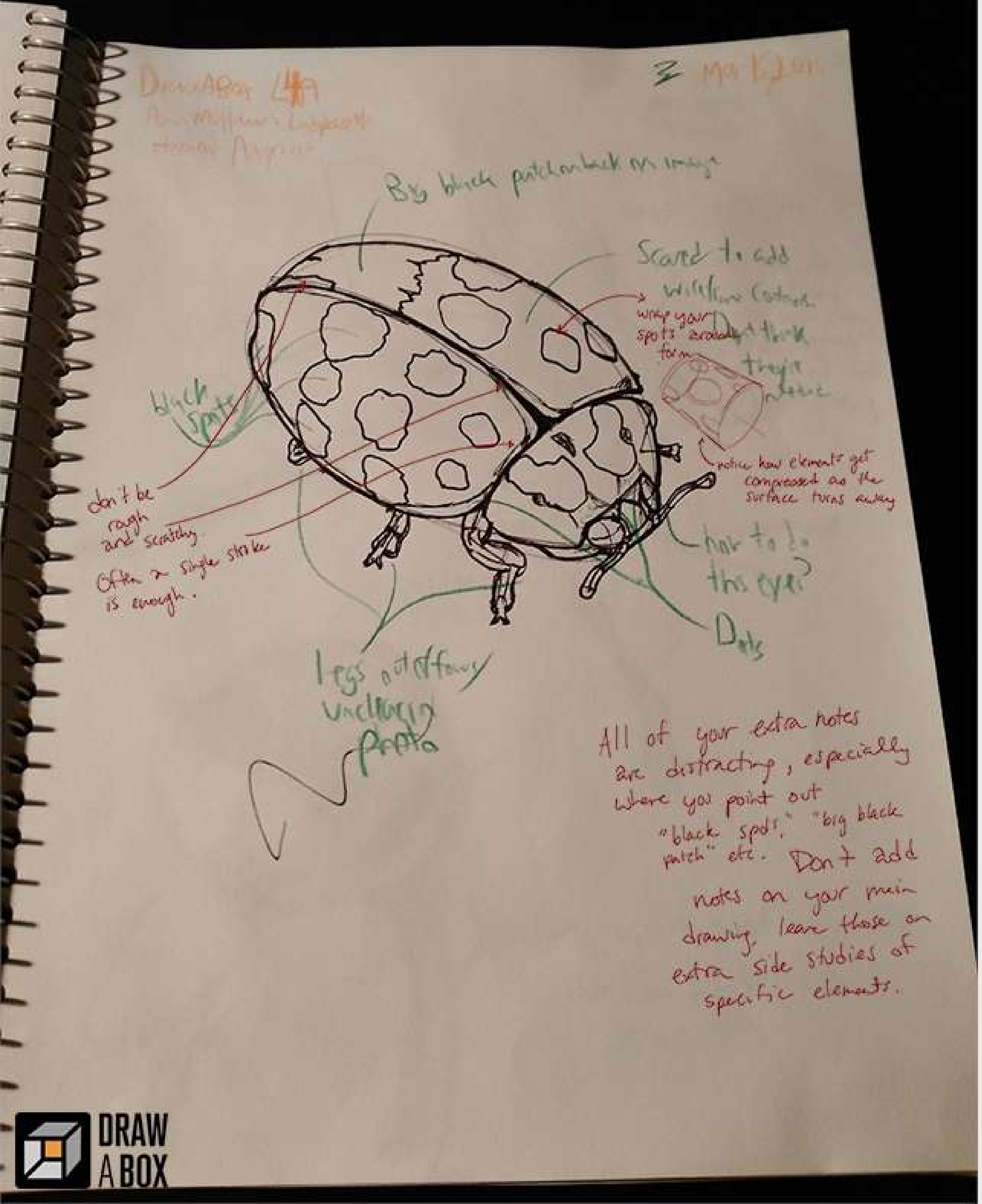


EVEN LITTLE SERRATIONS ARE FORMS.

EVERY MARK DRAWN IS EXECUTED CONFIDENTLY, AFTER PLANNING AND FORETHOUGHT. DRAW FROM YOUR SHOULDER AND DO NOT RUSH.


B1
2
Keep your width consistent. Don't pinch or swell, this undermines solidity.
vs
Abandoned
× draw organic forms, not stiff cylinders
vs
× multiple marks where a single stroke will do.
vs
× draw with shoulder


leg segment
smooth lines.
even/consistent width.
AUGH THIS IS TOO GROSS I HAVE TO STOP.


Big black patch on back on image
Scared to add with line contours
Don't think they're there
black spots
how to do this eye?
Dots
legs out of focus unclear in photo

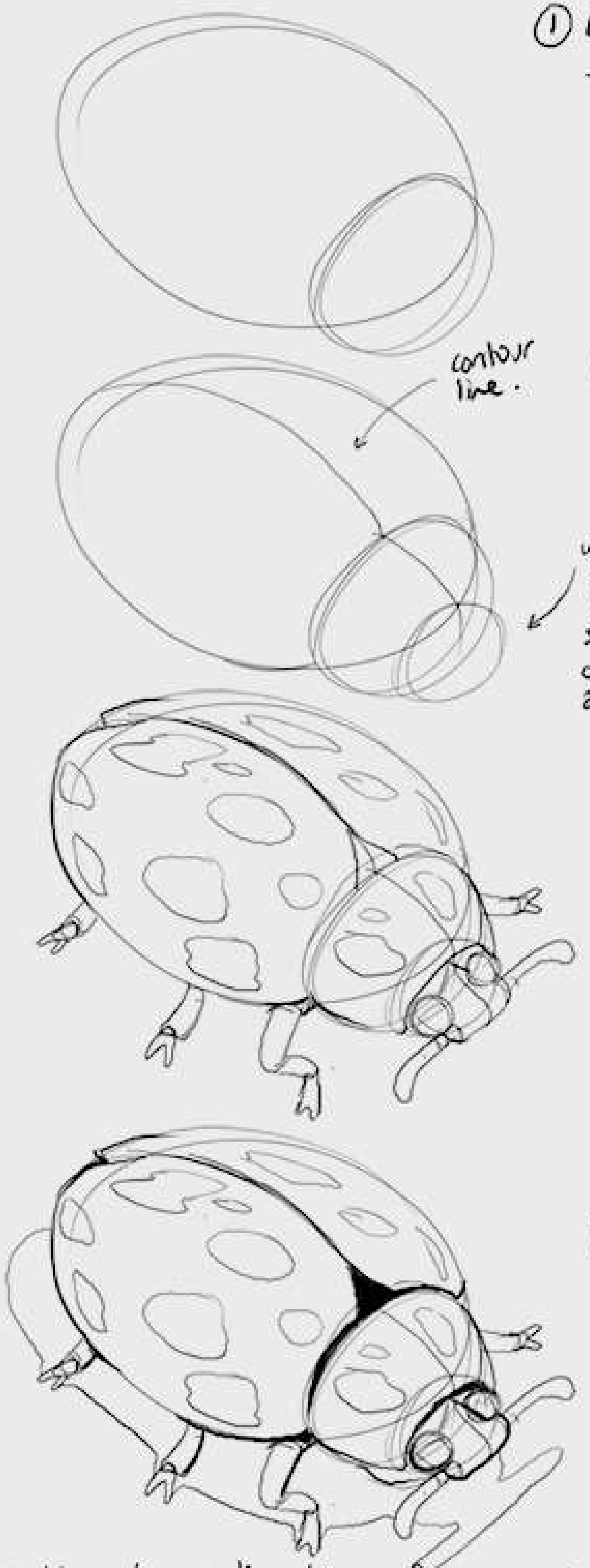
wrap your spots around form

notice how elements get compressed as the surface turns away

don't be rough and scratchy

Often a single stroke is enough.

All of your extra notes are distracting, especially where you point out "black spots," "big black patch" etc. Don't add notes on your main drawing, leave those on extra side studies of specific elements.



① Lay in your major masses. The abdomen/thorax stand out most.

contour line.

② Step one is NOT an approximate sketch. Those ellipses are the groundwork for the ACTUAL forms.

woops i forgot the head so i tacked on that form a little later.

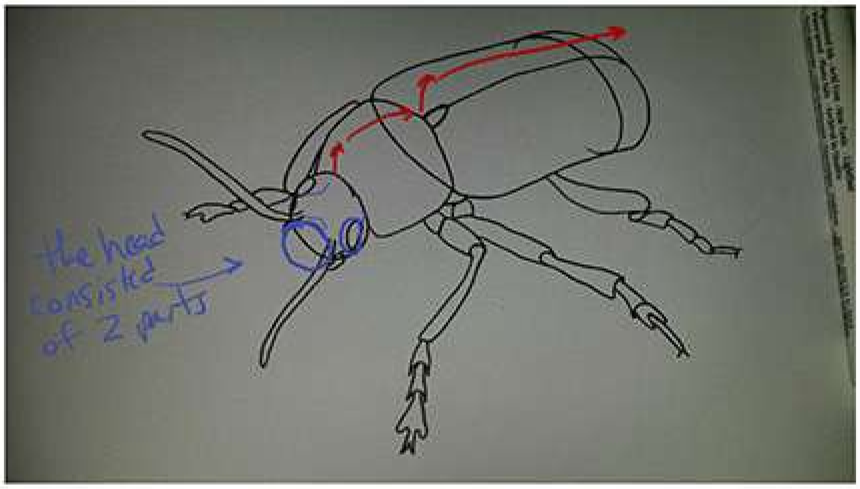
Here we turn those ellipses into forms, tracing their surfaces with contour lines.

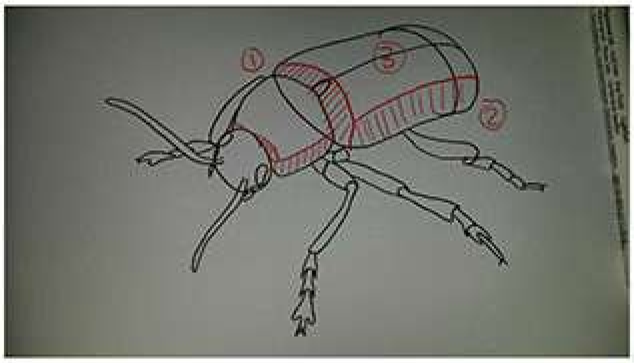
③ Build up more forms the important thing is to consider how each new form sits in space and how it interacts with the other forms.

NEVER just draw a mark without considering how it exists as a 3D element.

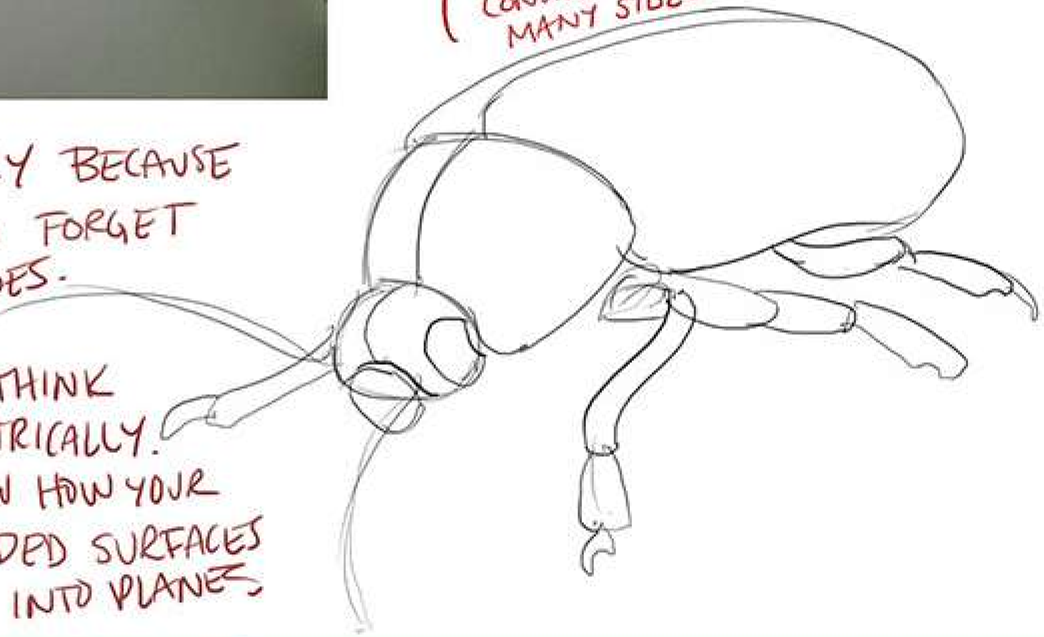
④ Line weight is a great way to show overlaps between forms and reinforce the solidity of the overall construction.

★ Notice how the lines from my initial lay-in are the main part of the final drawing — i don't do a "cleanup" pass or replace them. I merely reinforce the lines that already exist.


the head consisted of 2 parts



CONSIDER HOW FORMS HAVE MANY SIDES



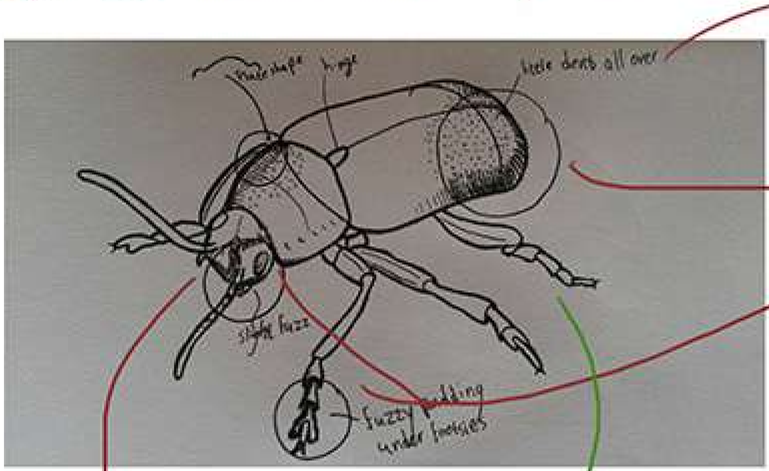
ORGANIC FORMS ARE TRICKY BECAUSE THEY ENCOURAGE YOU TO FORGET THAT FORMS HAVE SIDES.

CURVE
ORGANIC

HARD, STRAIGHT LINES
GEOMETRIC

ALWAYS THINK GEOMETRICALLY. KNOW HOW YOUR ROUNDED SURFACES BREAK INTO PLANES.

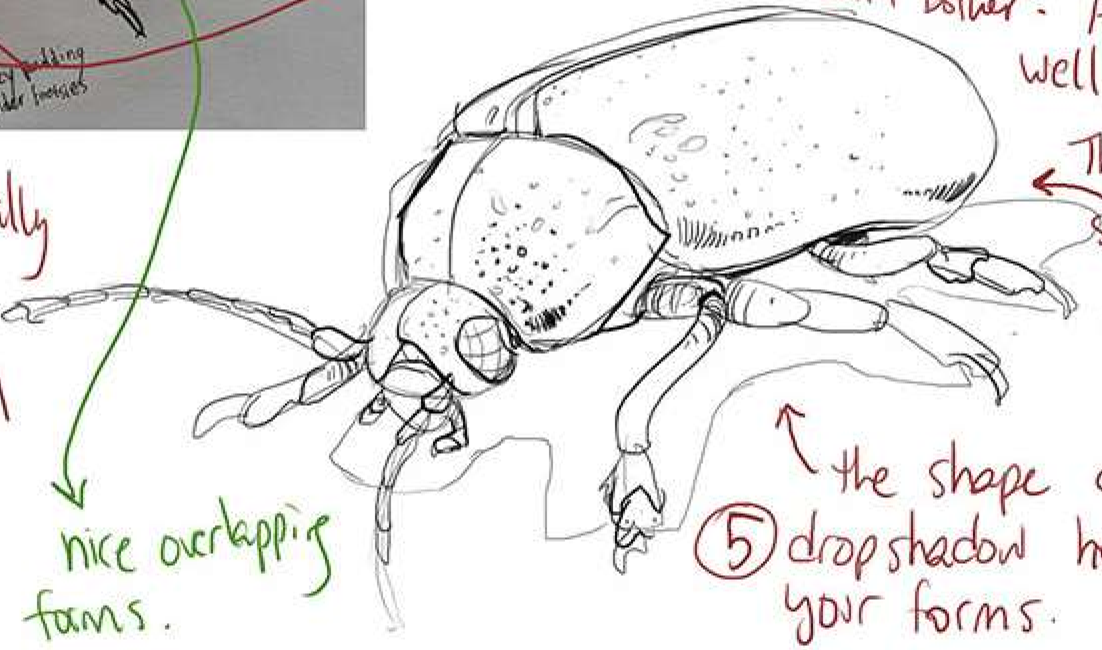
Pick 1 main focal point.



① Don't write the notes on your main drawing for now. They'll distract you.

② Hatching lines are mini-contour lines and should follow the curvature of your form.

③ If your drawing is too small to show some small details, don't bother. It won't read well.



This kind of subtle hatching works well to show a shiny shell.

④ Your lines are generally quite heavy. Draw bigger & control your pressure.

nice overlapping forms.

the shape of a ⑤ drop shadow helps ground your forms.

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Overview
- Introduction
- Major Masses
- Torso as a sausage form
- Limbs
- Additional masses
- Fur
- Homework and exercises

Wolf Demo
- Demo Video
- Reference
- Step by step

Tiger Head Demo
- Demo Video
- Reference
- Step by step

Video Demos
- Otter demo
- Head construction demo

White Pelican Demo
- Demo Video
- Reference
- Step by step

Informal Demos
- How to think about head construction
- Applying construction to "non-standard" animals
- Running rat
- Moose head construction gif
- Tapir head construction
- Donkey construction
- Puma construction
- Using cast shadows
- The torso sausage
- Gazelle head construction
- Bear construction
- Bear cub construction
- Fur
- Applying fur to a raccoon
- Oryx construction
- Elephant construction

Lesson 5: Applying Construction to Animals

Overview

LISTEN WITH DRAWABOX

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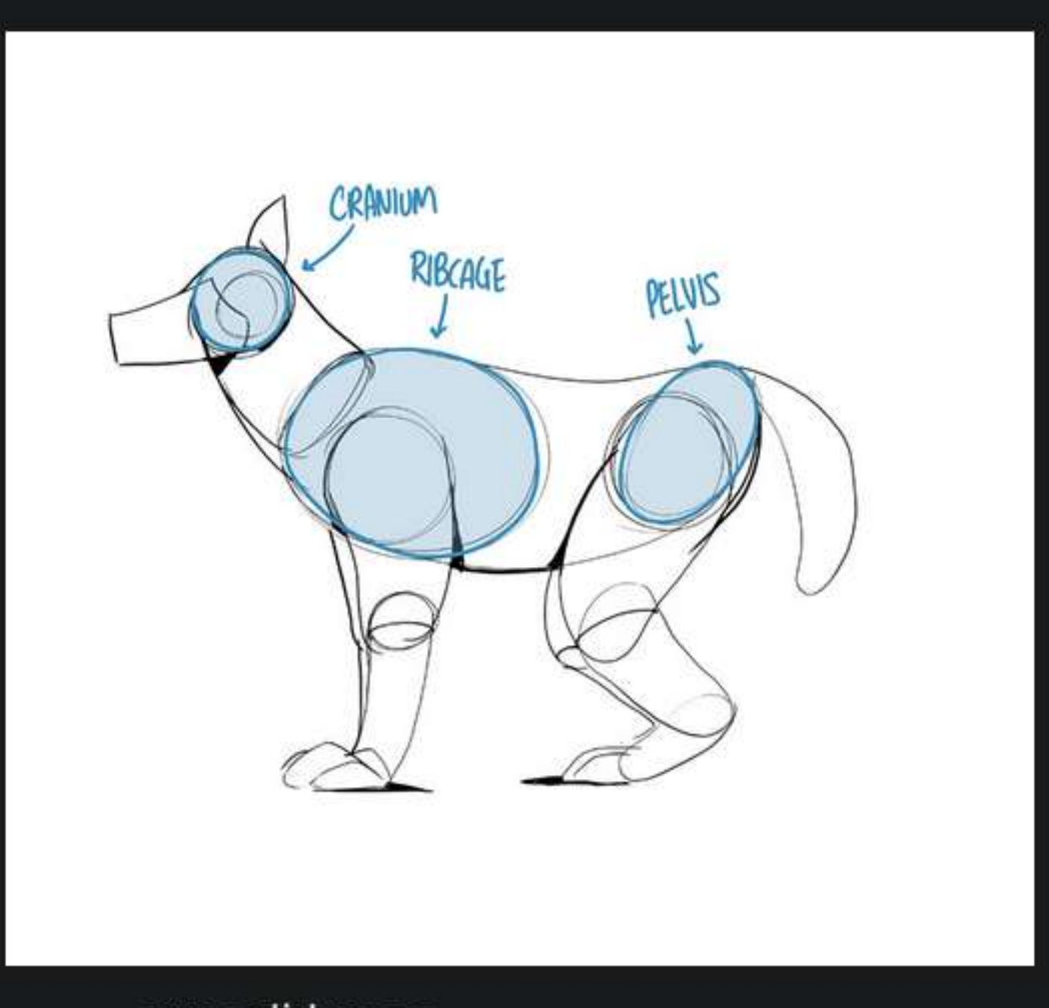
Introduction

It looks like one of the most popular lessons that people gravitate to are those on animals. This isn't remotely surprising.

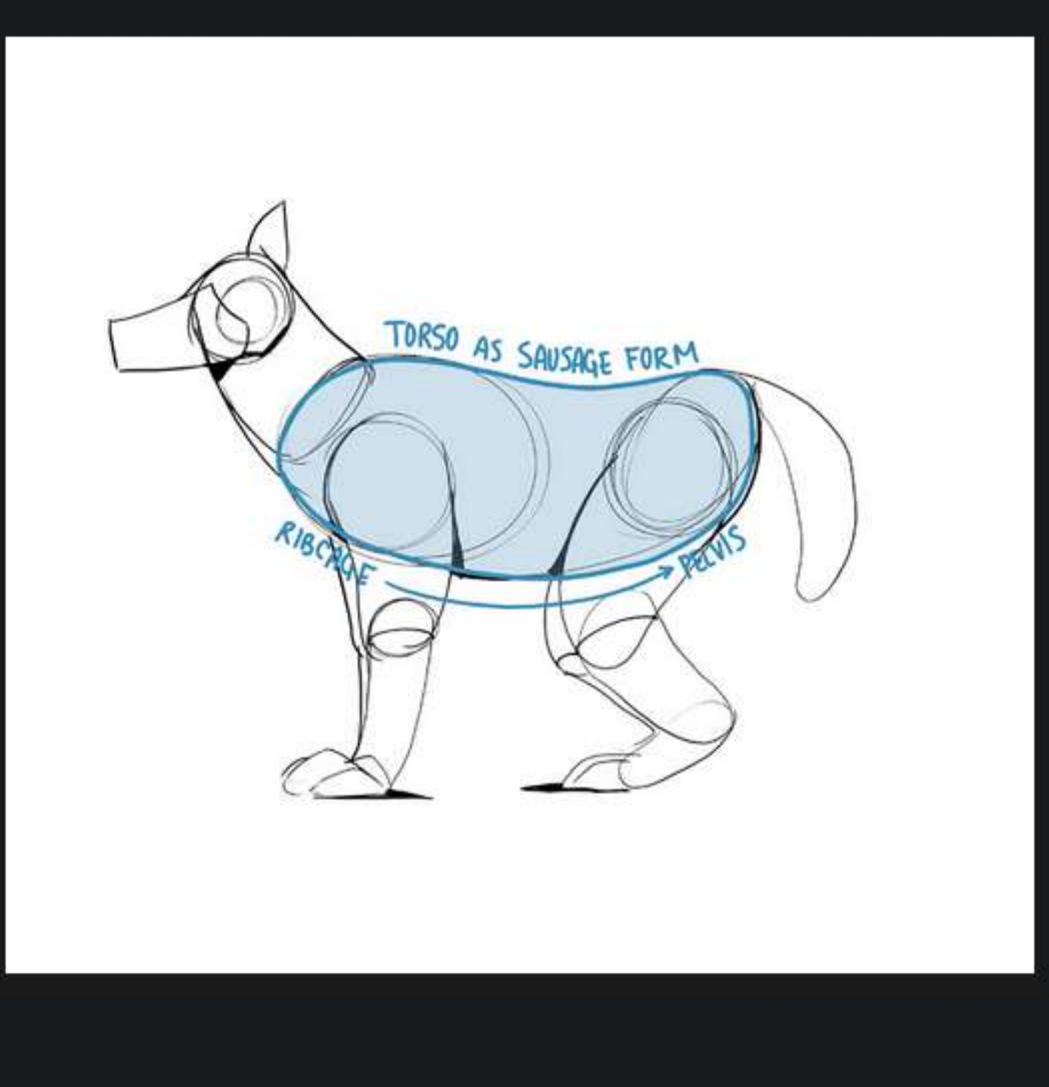
Here we're going to look at what goes into constructing a variety of animals, mainly to identify their similarities and to explore how construction can be applied to them, just as we've done with previous subject matter.



Major Masses

Similar to insects, animals also have three major masses that serve as the core of their bodies, and you can relate these directly to their corresponding masses in the human body as well.

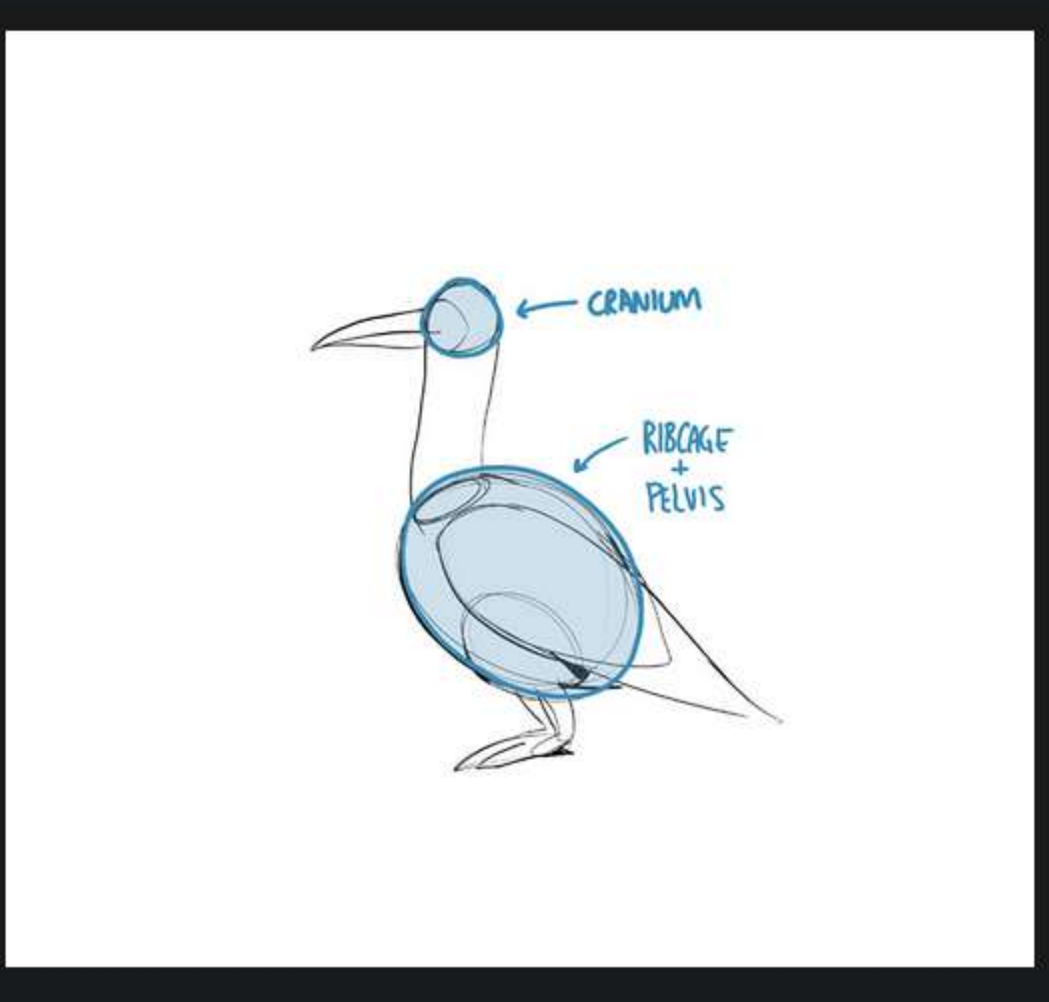
- **Cranium**. The base building block of the head, onto which additional forms are attached.
- **Ribcage**. Occupies roughly half of the torso length.
- **Pelvis**. A slanted, stretched ball that occupies roughly a quarter of the torso length, leaving a flexible quarter remaining unoccupied by any solid mass.



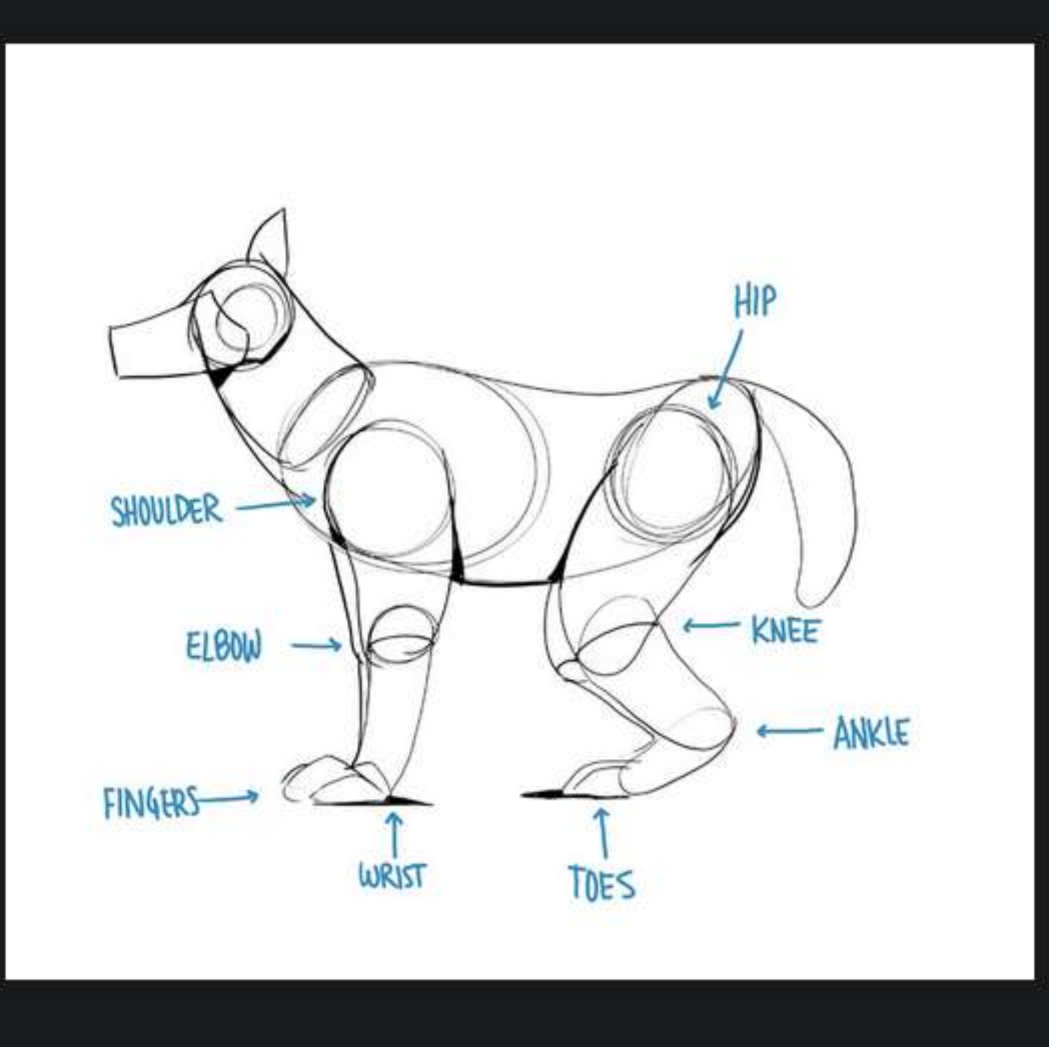
Torso as a sausage form

The ribcage and pelvis masses are generally used as building blocks on which to construct the torso. As depicted here, it encompasses both the ribcage and pelvis, and sags a little towards the middle.

I always incorporate this sag (though I make a point of finding hints of it in whatever reference I'm using, it's not always obvious), even when the back is flat or bulky with muscle - as shown a little further down, we add this additional padding later.



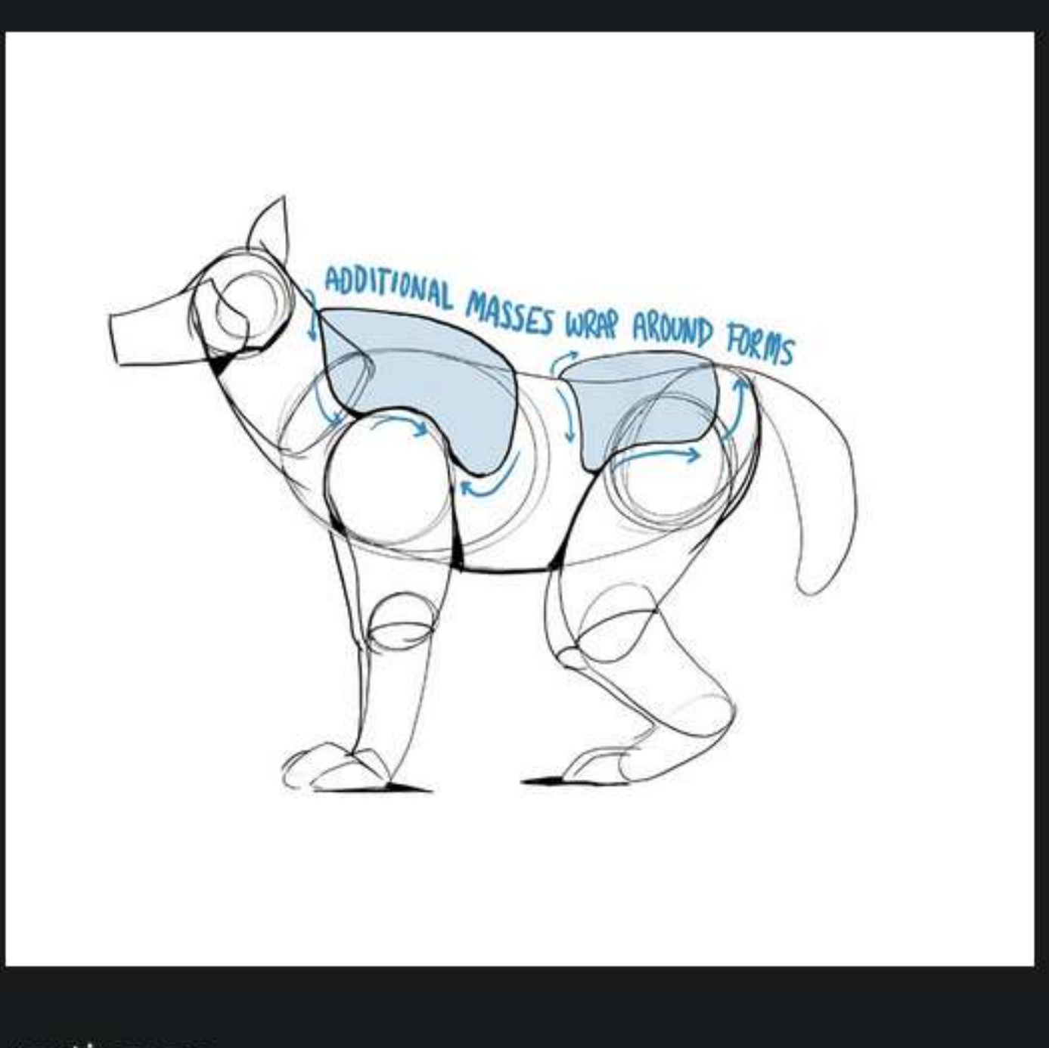
On some animals - mainly birds - there isn't much of a need to block in the ribcage and pelvis separately. We can instead start with a simple ball to represent the entirety of their torso.



Limbs

There's a lot of value in understanding how despite the incredible variety between different animals, we are all evolved from common ancestors. This understanding plays a big role in remembering the different components that exist in all animals - specifically because they exist in ourselves as well. The study of these differences and similarities is called *comparative anatomy*.

Here you can see the structure of an average quadruped's limbs. Just like humans, they share the same number of joints. The rear legs look a little strange to us, but only because the length from the ankle to the ball of the foot is much longer than it would be on a human. That whole section is still the foot however, and these animals walk on their toes (they are frequently referred to as being digitigrade, as opposed to humans, which are plantigrade, and hoofed animals, which are unguligrade).

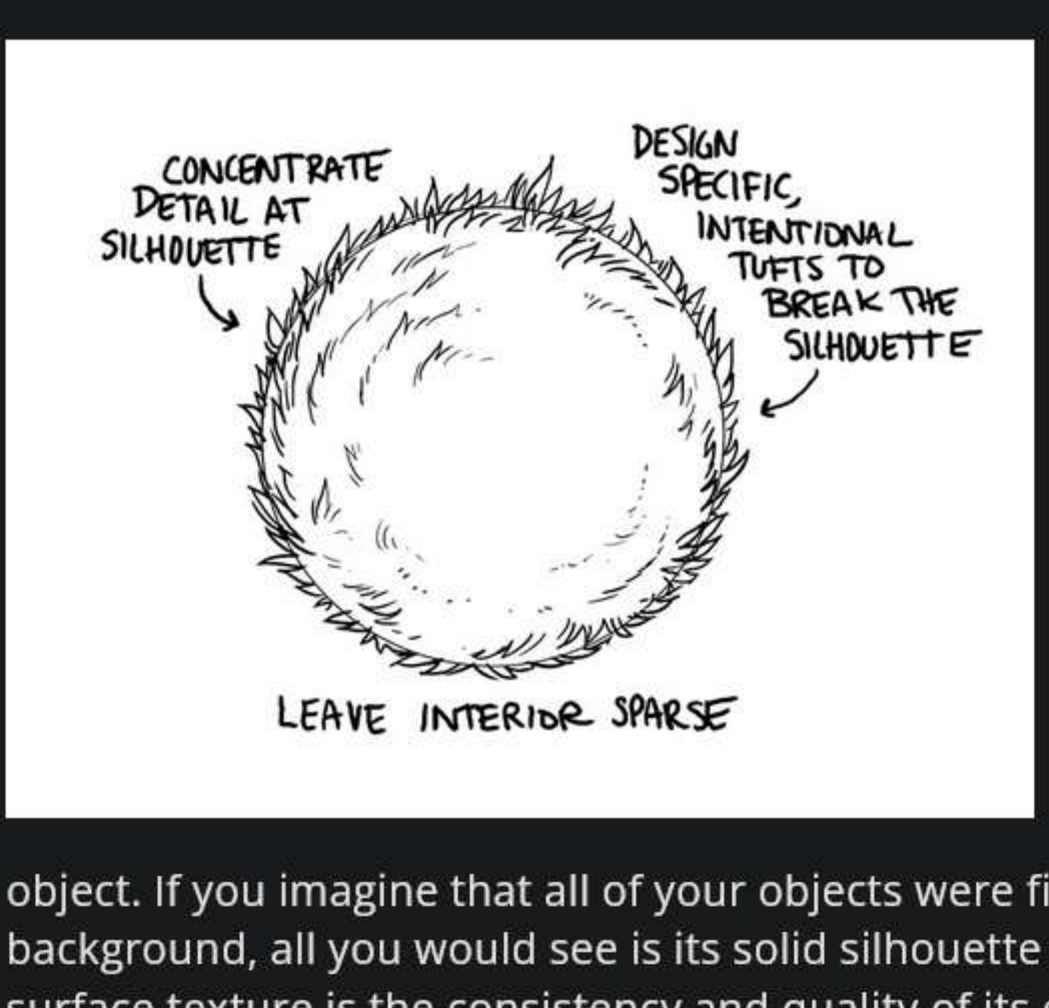

ADDITIONAL MASSES WRAP AROUND FORMS

Additional masses

Once you've got your major construction down, we start thinking about all the extra bulk that one might find in various places on the animal's body. To add this, we don't simply add shapes on like they're stickers - we have to add masses in a way that reflects our understanding of the relationship between the forms we're adding, and the forms that already exist in the scene.

This means going back to the organic intersections exercise and thinking about how these forms slump and sag against one another, and how they wrap along another's surface. Think of these as being sacks of flour, or balloons filled with water. They're not stiff - they'll conform a little to whatever they're resting on.

When looking at this image, I even want you to pay attention to how the contour curves themselves suggest a good deal of thickness to this mass as they hook around near the bottom, especially towards that front mass near the animal's head.


CONCENTRATE DETAIL AT SILHOUETTE
DESIGN SPECIFIC, INTENTIONAL TUFTS TO BREAK THE SILHOUETTE
LEAVE INTERIOR SPARSE

Fur

The other matter I wanted to touch upon is the issue of fur. It's *very easy* to get carried away with drawing fur textures, and most often it's really not necessary. Attempting to render fur will often result in a lot of contrast, which will create a focal point whether you want it or not. There are tricks, however, to imply the presence of a furry surface texture.

Instead of covering an entire object with fur, it is generally more effective to simply alter the silhouette of the object. This means applying your furry protrusions around the edge of the object. If you imagine that all of your objects were filled in with black against a solid white background, all you would see is its solid silhouette - and the only information you'd have to infer its surface texture is the consistency and quality of its edge. This is the type of information that viewers will read the quickest, and the kind of information that will stick the most.

It's also the reason that the sort of rough, chicken-scratch sketching that you see from beginners is to be avoided. As you gain more skill, you realize that the weaknesses from your early days can be harnessed as tools - as long as you can control them, and apply them only when needed.

As with all of the constructional drawing lessons, this lesson isn't about animals - it merely uses them as a tool to develop your internal model of 3D space, and your understanding of how forms relate to one another within it. But there is *so much* to dive into when it comes to understanding animals, from their individual anatomies and skeletal structure, to techniques for rendering their fur, scales, and more, and exploring it further is a great way to build up your visual library, and contribute to your own unique designs and ideas.

Here are some courses offered by our sponsor, **New Masters Academy**:

- How to Draw Animals with Glenn Vilppu
  In this course, Glenn leverages the same kind of techniques he uses from figure drawing to capture animals that don't merely sit statically on the page - they move through the space they occupy. He explores animal drawing beyond merely copying references, but rather focuses on developing in you the skills to draw them from your imagination, striving for a goal similar to ours here, but with a gesture-first approach. A great choice for anyone looking to design their own creatures.
- Introduction to Animal Anatomy with Joe Weatherly
  While in Drawabox we get away with focusing more on what we see in our references to inform the forms we build up (as that's enough for our purposes here), for those interested in drilling down deep into drawing animals, there's a lot more to understanding how these animals are actually built up. Joe Weatherly approaches teaching the anatomy of various animals by looking at horses, big cats, dogs and bovines, before digging into their skeletal structure and musculature, comparing the similarities and differences between them. The information he shares here is critical when it comes not only to drawing animals, but also to understanding what it is we see when drawing from life and from reference.

Sign up to New Masters Academy with the coupon code **DRAWABOX22** — you'll get a full **35% off your first billing cycle**.

Homework and exercises

Before starting the homework, be sure to go through all of the demonstrations included in this lesson. I strongly recommend drawing along with them as well and following them closely when doing so.

Also, remember that this homework must be drawn from reference. When looking for reference, I recommend that you specifically look for those of a higher resolution. Google's image search tools allows you to limit your search to *large* images, and I recommend you take advantage of this.

To get you started, check out Warren Photographic Image Library of Nature and Pets, which comes at /u/Serpes' recommendation.

The homework assignment for this section is as follows:

- 2 pages of organic intersections, just like from lesson 2
- 2 pages of birds, 1 of which should be construction only (with no detail or texture)
- 4 pages of **two** non-hooved quadrupeds (wolves, cats, bears, ferrets, etc.) - meaning, pick two subjects and do two full pages for each.
- 4 pages of **two** hooved quadrupeds (horses, deer, antelope, camels - I'll also accept rhinos, elephants, etc. despite not being hooved, as it's more about the configuration of their bodies than the specifics of their feet)
- 2 pages of any random animals of your choice - take this opportunity to try a wider variety (lizards, fish, etc.)
- 1 page of hybrids - taking various pieces of references (preferably ones you've had a chance to study over the course of this lesson), try to combine them to make some interesting new creatures

All the assigned work for this section should be done in ink, using fineliners/felt tip pens as described here. You may also use a brush pen to fill in dark areas, but not for your linework.

Wolf Demo >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Drawabox-Tested Fineliners (Pack of 10, $17.50 USD)

Let's be real here for a second: fineliners can get pricey. It varies from brand to brand, store to store, and country to country, but good fineliners like the Staedtler Pigment Liner (my personal brand favourite) can cost an arm and a leg. I remember finding them being sold individually at a Michael's for $4-$5 **each**. That's highway robbery right there.

Now, we're not a big company ourselves or anything, but we have been in a position to periodically import large batches of pens that we've sourced ourselves - using the wholesale route to keep costs down, and then to split the savings between getting pens to you for cheaper, and setting some aside to one day produce our own.

These pens are each hand-tested (on a little card we include in the package) to avoid sending out any duds (another problem with pens sold in stores). We also checked out a handful of different options before settling on this supplier - mainly looking for pens that were as close to the Staedtler Pigment Liner. If I'm being honest, I think these might even perform a little better, at least for our use case in this course.

We've also tested their longevity. We've found that if we're reasonably gentle with them, we can get through all of Lesson 1, and halfway through the box challenge. We actually had ScyllaStew test them while recording realtime videos of her working through the lesson work, which you can check out here, along with a variety of reviews of other brands.

Now, I will say this - we're only really in a position to make this an attractive offer for those in the continental United States (where we can offer shipping for free). We *do* ship internationally, but between the shipping prices and shipping times, it's probably not the best offer you can find - though this may depend. We also straight up can't ship to the UK, thanks to some fairly new restrictions they've put into place relating to their Brexit transition. I know that's a bummer - I'm Canadian myself - but hopefully one day we can expand things more meaningfully to the rest of the world.

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Tiger Head Demo
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Video Demos
- Otter demo
- Head construction demo

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- Tapir head construction
- Donkey construction
- Puma construction
- Using cast shadows
- The torso sausage
- Gazelle head construction
- Bear construction
- Bear cub construction
- Fur
- Applying fur to a raccoon
- Oryx construction
- Elephant construction

Lesson 5: Applying Construction to Animals

Wolf Demo

Hate to read? No problem. **We can read the text to you**.

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

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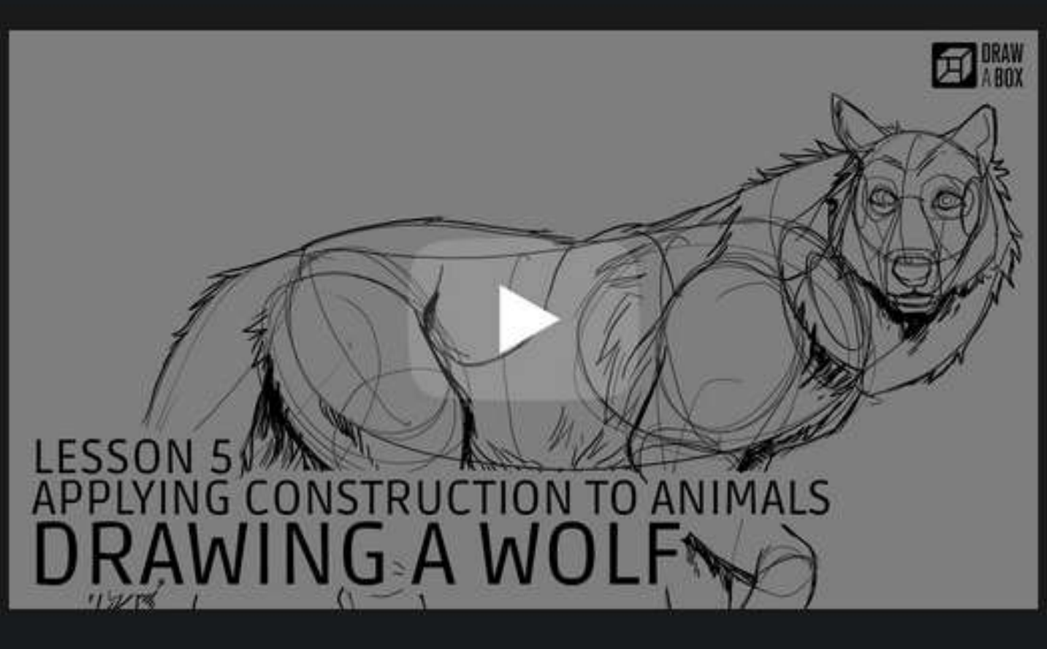
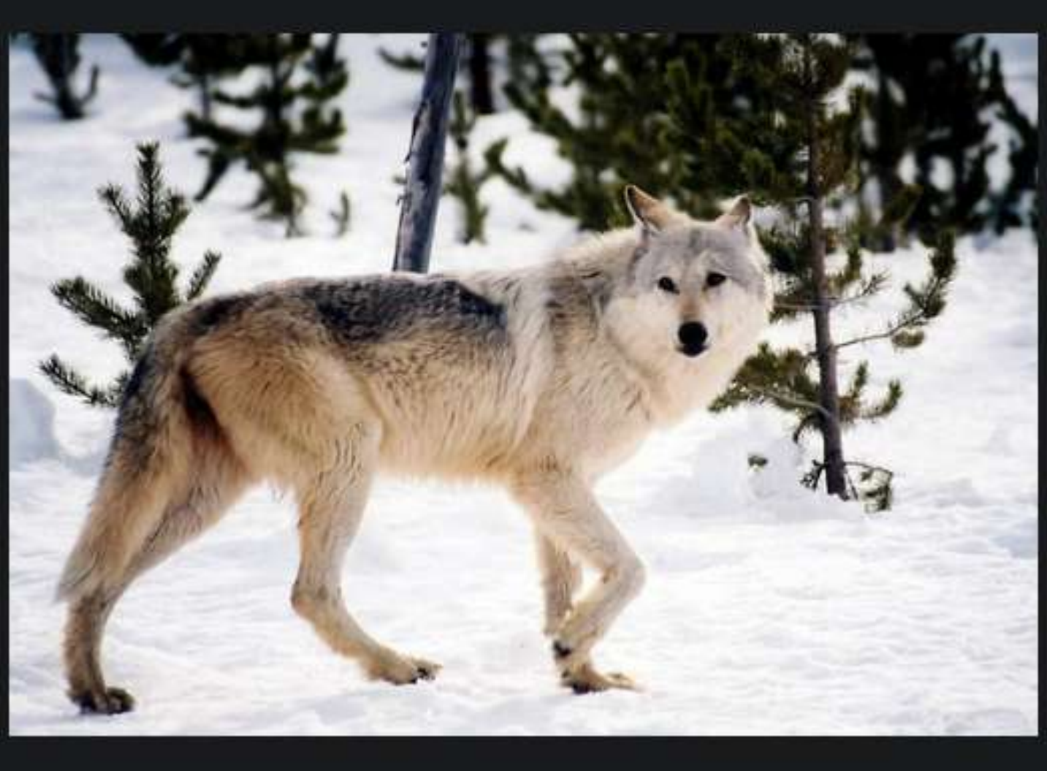


Demo Video

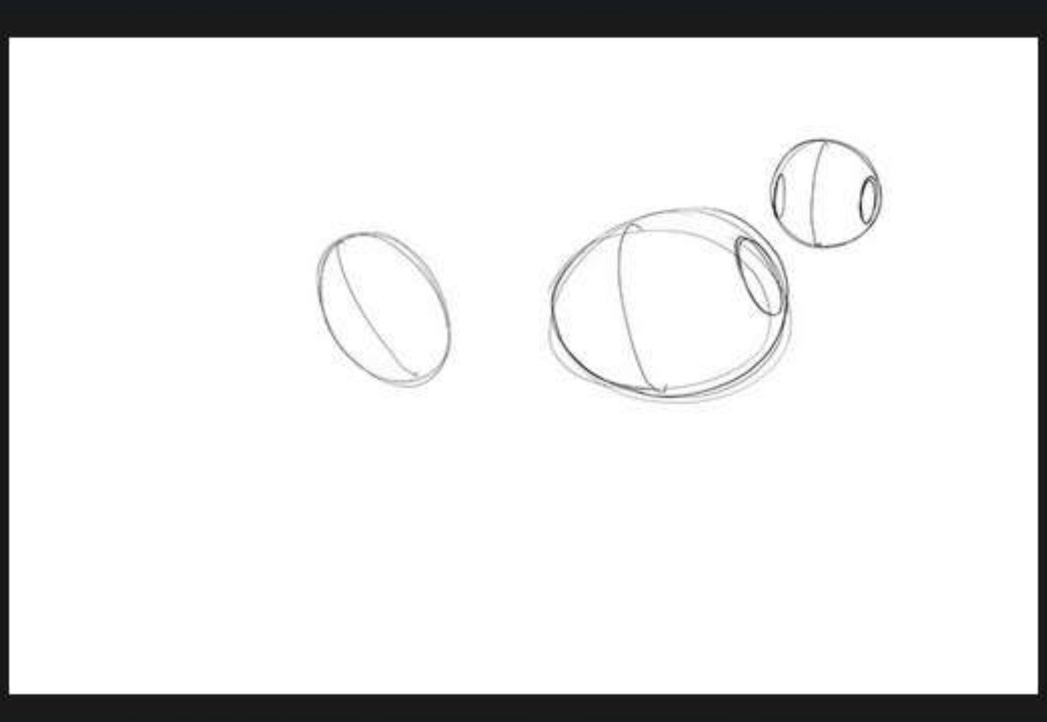
This demonstration covers a lot of problems that are faced in most animals one might try to draw - from basic components of the body, adding additional masses, constructing legs, and facial construction.

The demo video includes full audio and discussion of the concepts demonstrated in the drawing.



Reference

Here's the reference we'll be working from. Being high resolution and having clear view of most of the wolf's body (including most of the feet), it should serve our purposes quite well.

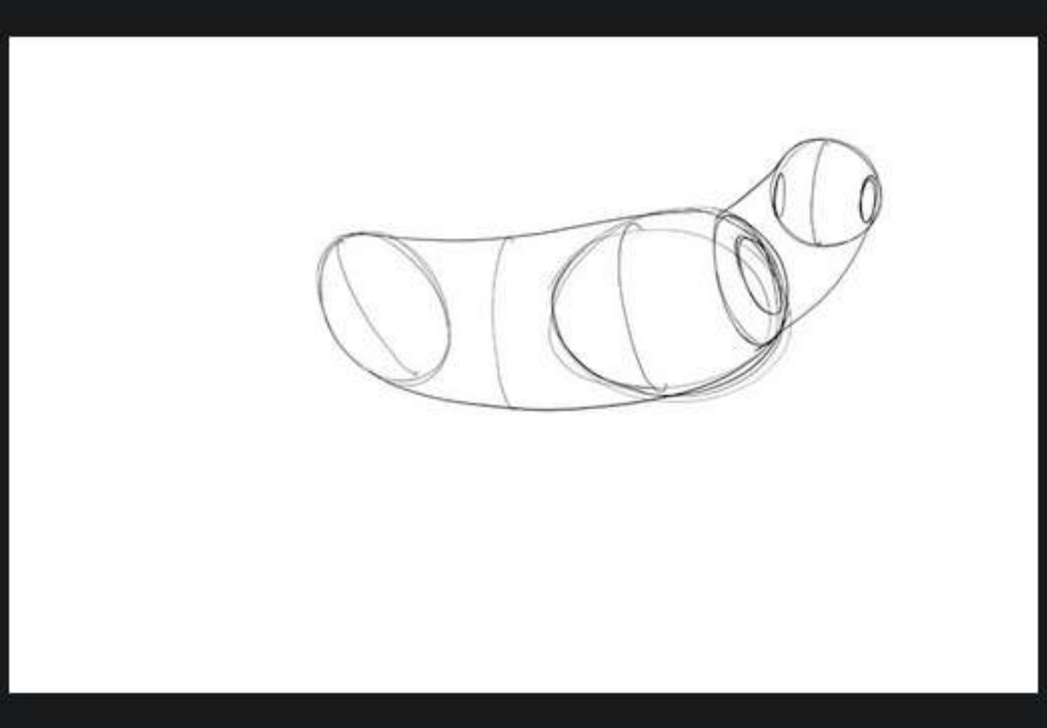


Step by step

To start with, we've got the three major masses, similar to those introduced in the previous lesson:

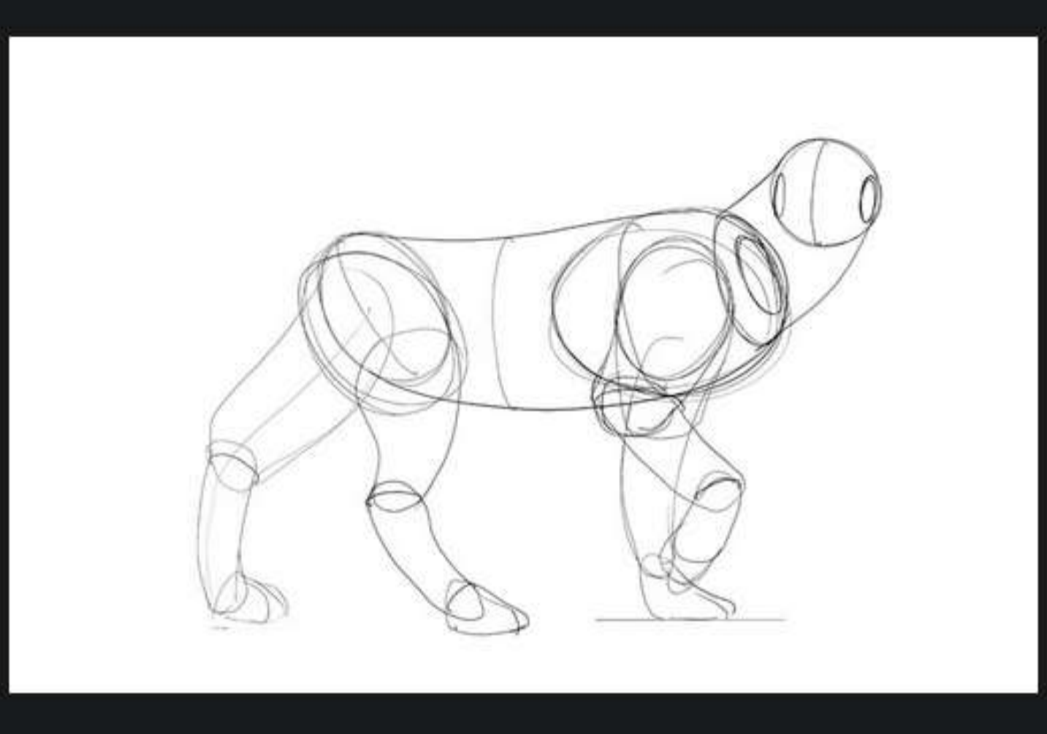
- Head. Better referred to as the cranial mass, which is the basic building block of the rest of the head. It is NOT meant to encompass the entirety of the head, so don't go building this to be enormous. Smaller is better, as you can always add more forms on top later.
- Rib cage. This is generally going to occupy a full half of the length of the torso on most, if not all animals (humans included). Students frequently draw this as being much smaller than it needs to be, so try and think about how your own rib cage fits into your body if you're unsure of how large it should be.
- Pelvis. This takes up about a quarter of the torso, leaving another quarter not occupied by anything solid (between the rib cage and the pelvis). Be mindful of how this one is going to be angled. Don't draw it as a sphere, as it's got a bit of length to it as shown here.

As you draw these components, make sure that each one feels solid and three dimensional to you. Use contour lines (curves as well as ellipses) as needed, just make sure you're taking your time when drawing them. A sloppy, rushed contour line isn't going to do much aside from cluttering your drawing.



We're doing two critical things here - first we're constructing a sausage form for the torso that snugly encompasses both the rib cage and pelvis masses. Notice how they're not floating loosely inside of it, but rather hold very tightly to their new container.

Additionally, we're pulling the neck down from the cranium to essentially plug into the torso, defining that intersection with a clear contour ellipse. Again, we don't want the cranial mass floating inside of this neck form - it should be holding snugly to it.

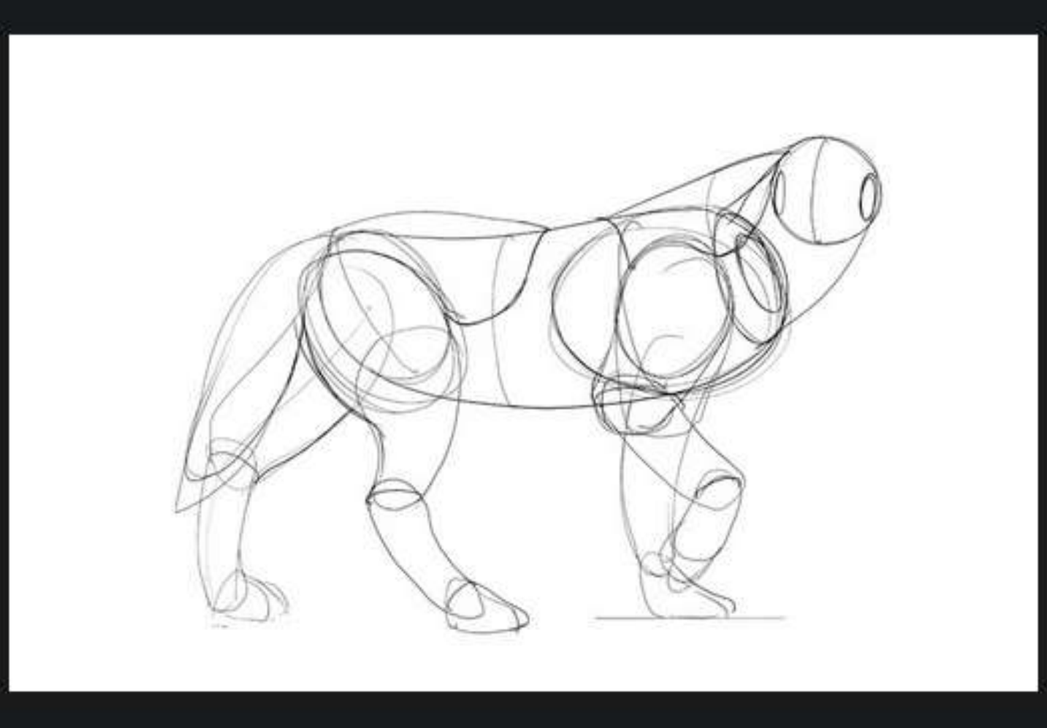


Next, the legs. Before starting on the legs, I lay out an ellipse where they're actually going to connect to the body. You can also see this as a large mass representing the shoulder, which tends to have some large musculature to it.

I frequently have students ignoring this entirely, drawing the legs as though they sprout from the bottom of the torso. This is not correct - just like our (humans') arms, the animal's legs will sprout from its sides.

The legs use the same sausage technique covered in the previous lesson, and we only place contour curves at the joints, leaving the lengths of the sausages to be freely gestural and flowing.

Lastly, even though I've not put much linework into the paws, be aware at least of the planes of those forms. That is, you should be able to, at a glance, understand where the top, sides and front of that form are distinguished from each other. If you can't, you've likely just drawn a flat shape with no consideration for how it sits in 3D space.



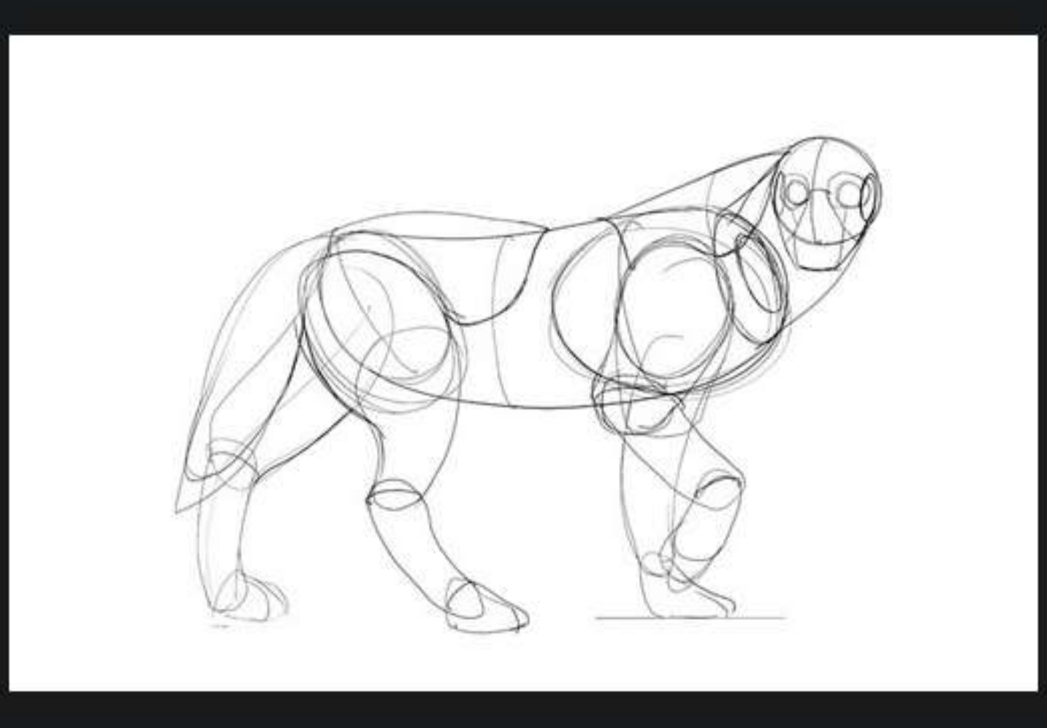
Now comes a point that many students have difficulty with - adding additional forms.

You'll notice that in most, if not all of my animal constructions, I try to use the same torso configuration. That is, as it covers the space from rib cage to pelvis, it dips down slightly, leaving a distinct curve along the spine.

In a lot of animals, you actually see bumps along this area, as you see in this wolf reference. In order to capture this, I will add additional forms to our construction.

The trick to doing this is to understand how these forms actually rest on top of each other. Too many students will just draw a shape on top, sticking it on as though it were a sticker on the page, and then after the fact go in with additional contour lines to cheat it into that third dimension.

This doesn't work - if the silhouette of the form you've drawn doesn't convey an understanding of how it sits in 3D space, and how it relates to the other forms in the scene, then all the contour lines the world will not salvage it. Instead, you need to think about how these forms are going to wrap around each other - consider the surfaces present, and how one form is being dropped on top of the other. This is entirely similar to the organic intersections exercise in lesson 2, and is the primary reason that exercise was covered there.

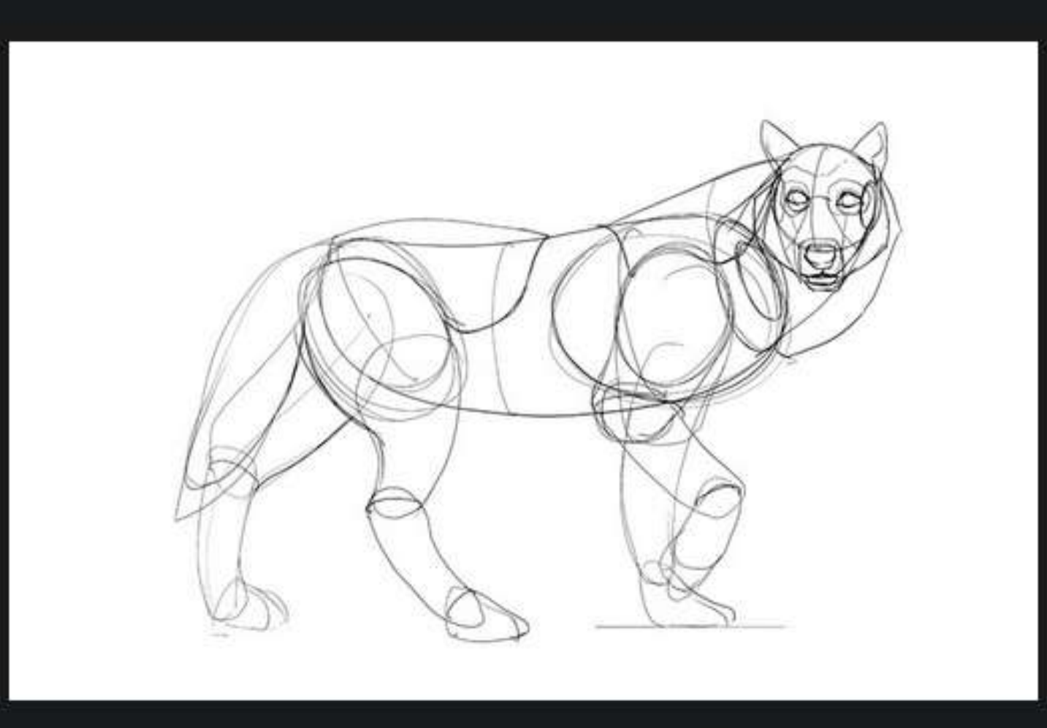


Here we get into the head construction. The key here is that we are constructing the head as though it is a three dimensional puzzle, with a number of different pieces that all snap together. To draw one component without awareness of how it connects with other parts of the skull and face leaves us with features that float arbitrarily, and this breaks the illusion.

Additionally, thinking about it this way immediately forces us into identifying the various planes of the face - splitting it up from being smooth curves that blend seamlessly into one another to having clear borders that can be used to differentiate these "puzzle pieces".

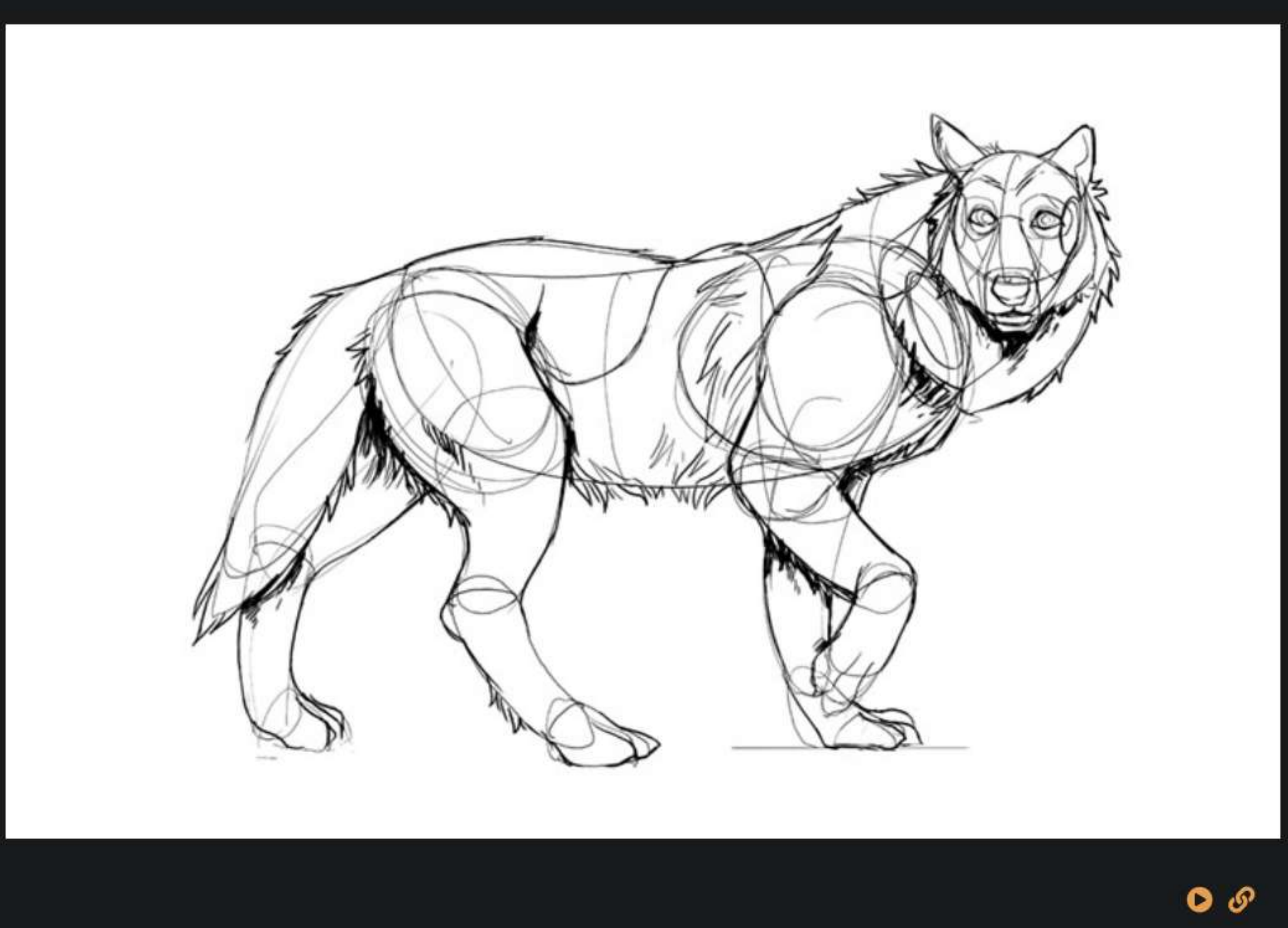
In this step, we've cut the eye sockets into the skull - not as ellipses, but with individual cutting lines that are each of them drawn with an awareness of how they run along the surface of the skull. Using an ellipse in this case (for the eye socket) is inappropriate because it's a matter of taking a flat, two dimensional shape and just stamping it onto what we have already established as being solid and three dimensional, thus flattening everything else out.

Additionally, we've established a sort of "footprint" where the muzzle will attach. You can think of it as though that section of the face has been flattened, and will eventually be extruded out. By planning it out this way, we introduce yet another puzzle piece without having to worry about the additional form just yet.



Now we extrude that muzzle out into another planar, boxy form. Planes are, once again, key. You should be able to distinguish the top, side, front, etc. rather than having a form where everything is smoothly blended into one another.

I've also added a mass to represent what is mostly fur along the side of the head. I'm not too keen on making this appear solid - it definitely has volume, and probably has some muscle there, but because most of it is likely fur I'm still leaving it a little lighter and free of additional contour lines.



The rest, as always, is just detail. Tufts of fur - each designed specifically and carefully rather than zigzagging back and forth on autopilot. A couple of carefully placed tufts along the silhouette will do considerably more for the drawing than trying to cover the whole thing in a jagged mess of lines that follows the same repetitive rhythm.

Also, with all constructions, strategically employing line weight to clarify the overlapping of forms, and cast shadows to help separate them out can be extremely effective - just don't overdo it. As a rule, less is always better, as is a subtle touch rather than a heavy, obnoxious one.

<<< Overview

Tiger Head Demo >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Sakura Pigma Microns

A lot of my students use these. The last time I used them was when I was in high school, and at the time I felt that they dried out pretty quickly, though I may have simply been mishandling them. As with all pens, make sure you're capping them when they're not in use, and try not to apply too much pressure. You really only need to be touching the page, not mashing your pen into it.

In terms of line weight, the sizes are pretty weird. 08 corresponds to 0.5mm, which is what I recommend for the drawabox lessons, whereas 05 corresponds to 0.45mm, which is pretty close and can also be used.

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Lesson 5: Applying Construction to Animals

Tiger Head Demo

Hate to read? No problem. **We can read the text to you**.

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

Just click "Listen with Drawabox"!

Whether before or after looking through this demonstration, I strongly encourage you all to look at this explanation in the informal demos page. This tiger head demo still has a fair bit of value, but the explanation there more accurately reflects the way I will be explaining these concepts moving forwards. I am currently working through revising all of the lesson content from Lesson 1 onwards (mainly to make the material more succinct, improve production quality, and to make minor tweaks here and there) and when I get to Lesson 5, the concepts covered in the informal demo will serve as the foundation of how I approach head construction.

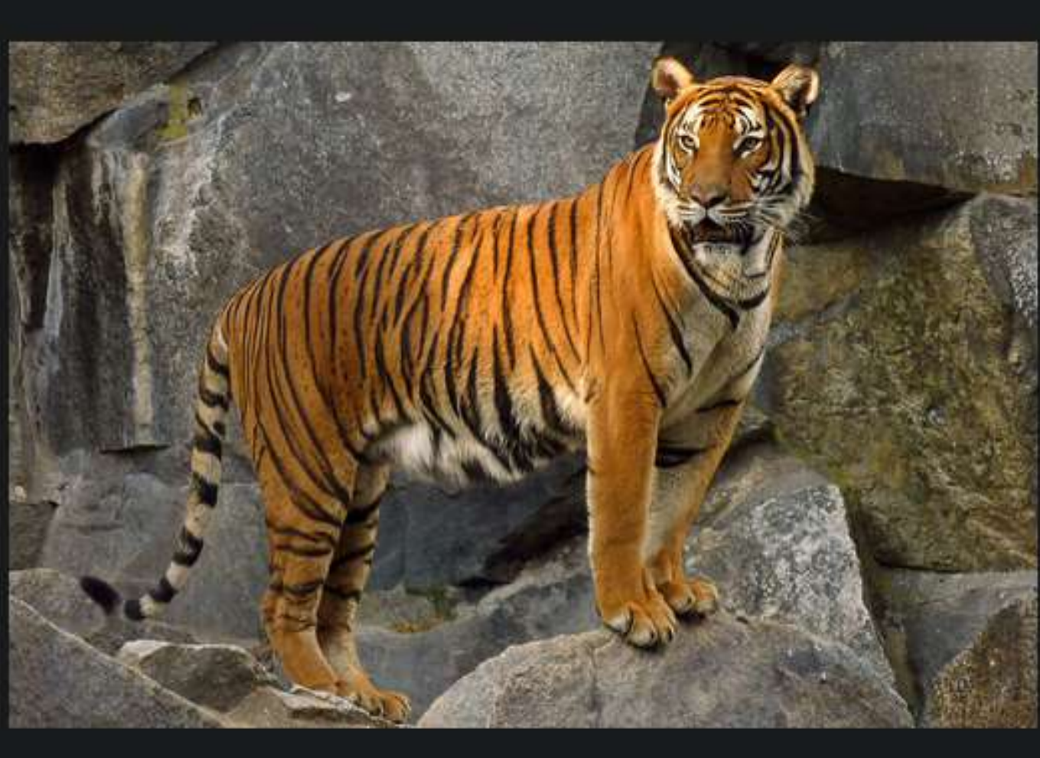
For now, you'll have to make do with what is there.

Demo Video

This demonstration focuses in on constructing the head of an animal. Though there are many different kinds of animals out there, these principles generally apply across the board, as they speak more to how forms fit together in the kinds of complicated arrangements that faces require.

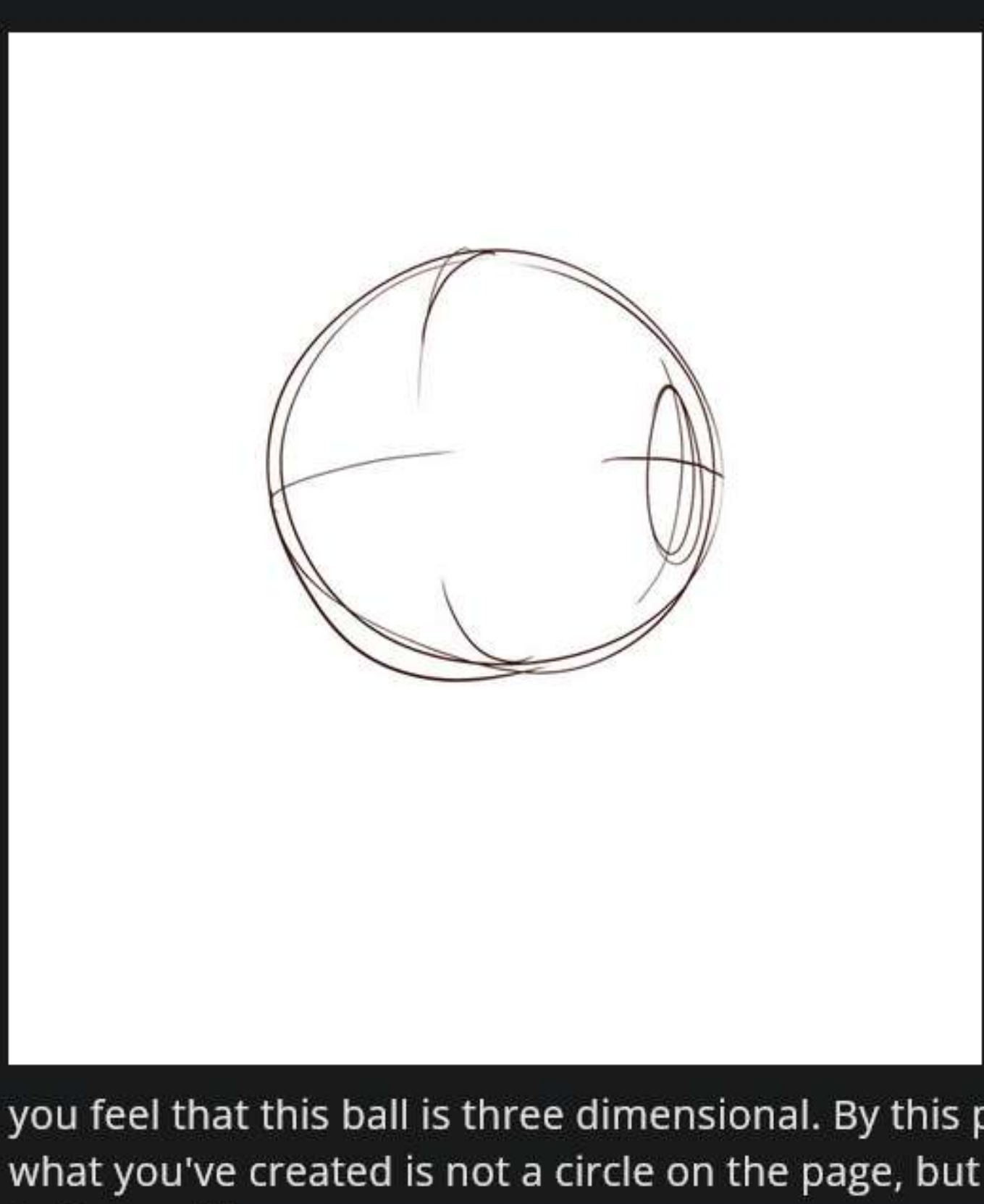
The demo video includes full audio and discussion of the concepts demonstrated in the drawing.

Reference



Here's our reference, though we're mostly going to ignore the body and focus in on his handsome, fuzzy face.

Step by step

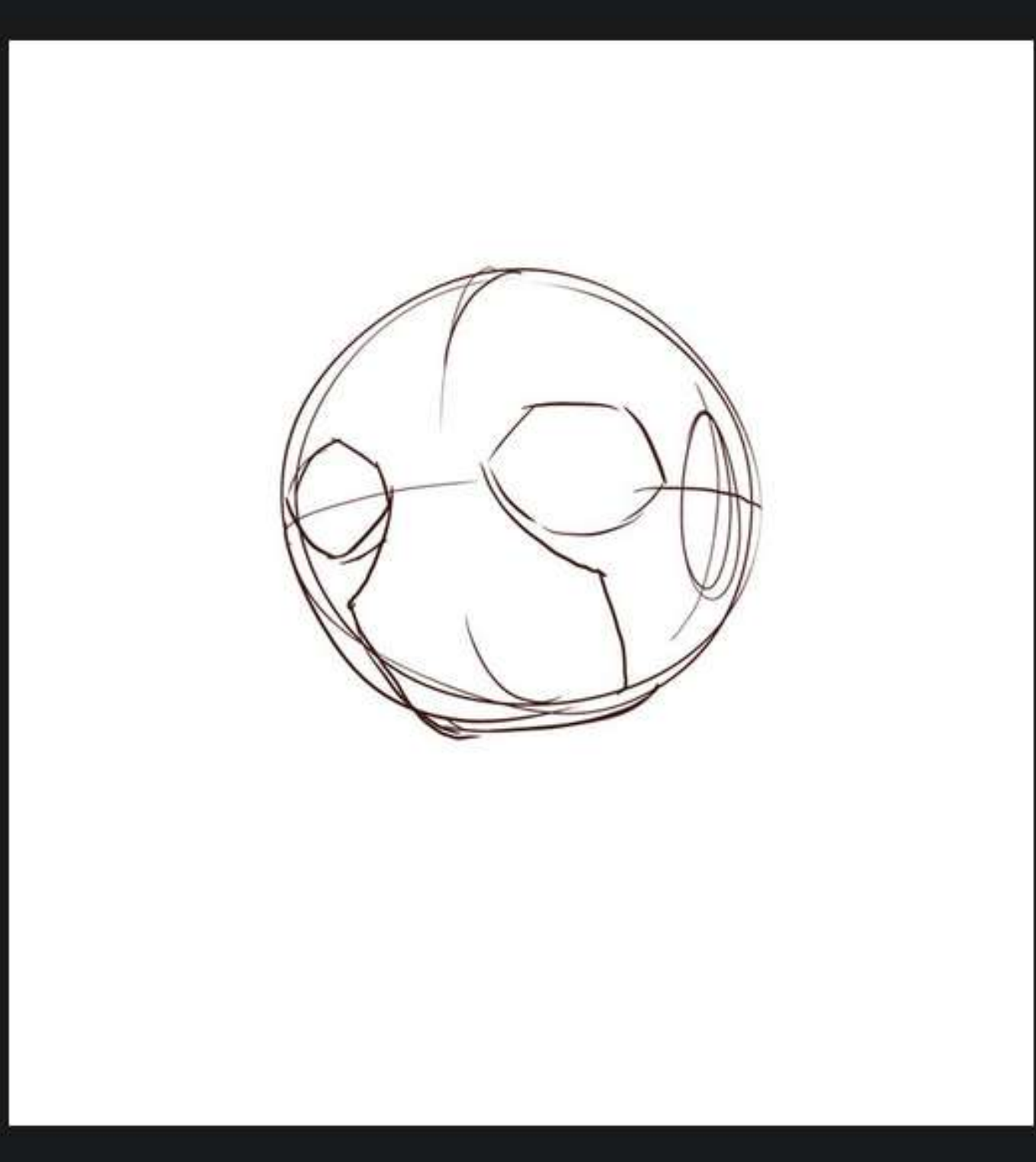


As with just about all of our constructions, we start with a simple, initial mass. In this case, we're looking specifically at the cranial ball that we use in the rest of our animal constructions.

As I've mentioned in other demos, **this is not going to encompass the whole head**. It is a beginning building block, and we will be adding additional forms to it. Don't draw it to be needlessly large - if you need to, lean towards making it smaller, as you can always add more padding to it later.

Specifically, this mass relates to the back of the skull - it does not include all the muscle and fur you may find on an animal that serves to add bulk to the overall appearance.

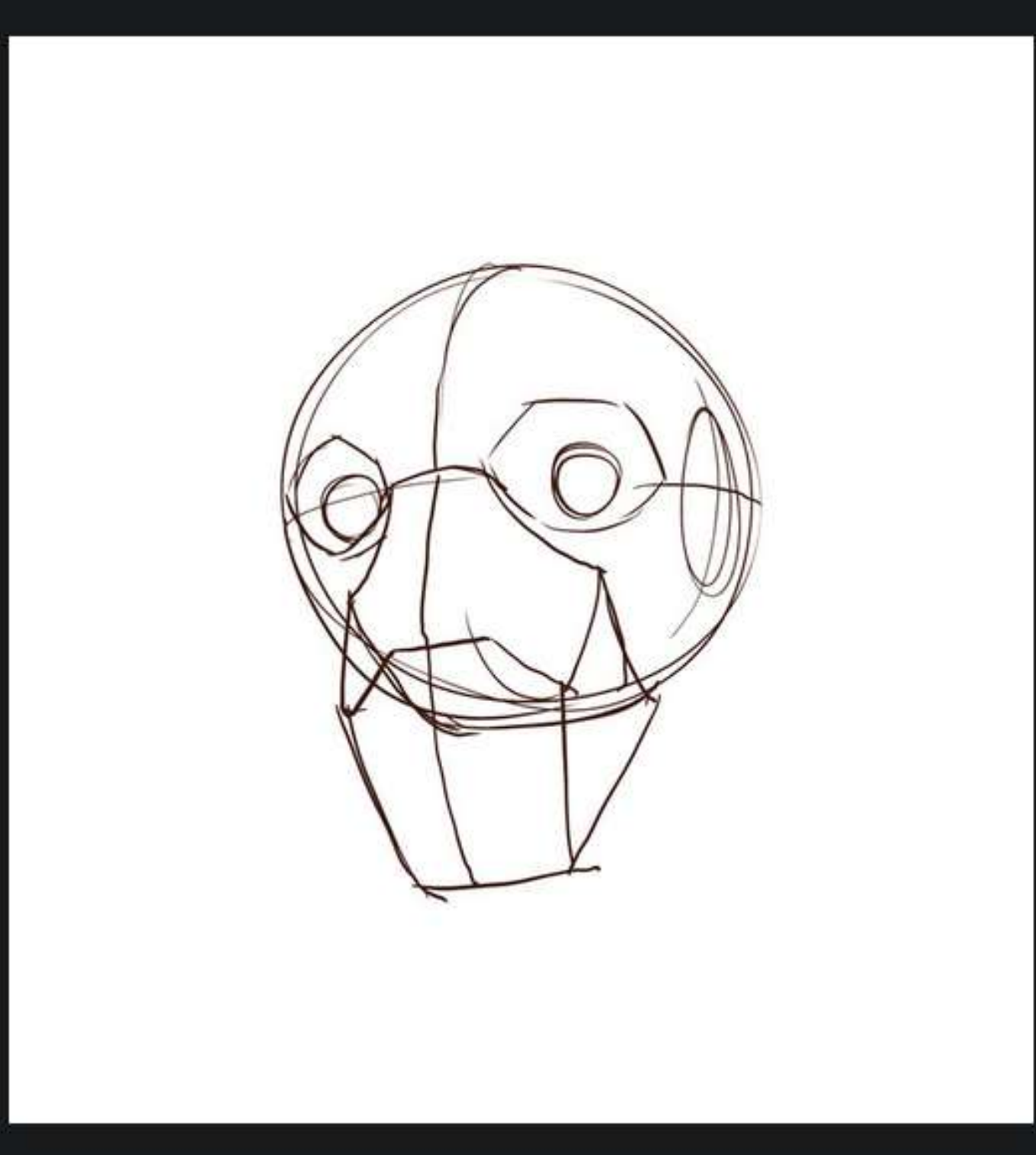
Make sure that you don't leave this stage until you feel that this ball is three dimensional. By this point, you should be confident in your belief that what you've created is not a circle on the page, but rather a solid, three dimensional form that exists in the world.



Here we're carving in our eye sockets and establishing the "footprint" of the muzzle. That is, the part to which the muzzle, which will be an additional form we introduce later, attaches.

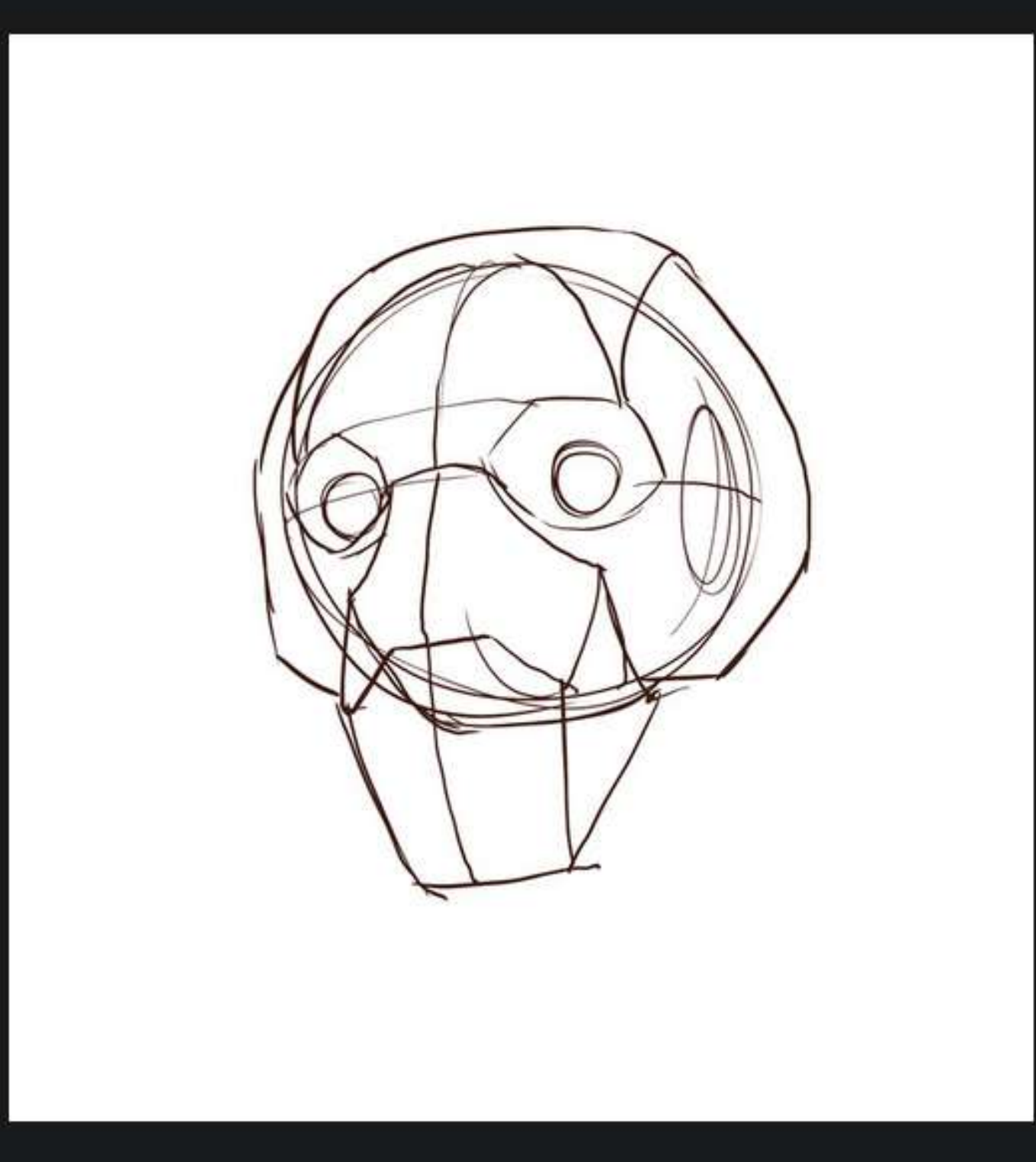
When dealing with eye sockets, I frequently have students who will block that in as a simple, continuous ellipse. This is not the ideal solution to this problem however, as you're essentially taking a flat shape and sticking it on top of a three dimensional form. The result is that your 3D form gets flattened out.

Instead, cut your eye socket into the form using a series of distinct lines. These lines should each be drawn with consideration for how they follow along the surface of the form, like you're carving into it with a knife. They should be angular, not smooth, to continue to accentuate your awareness of the planes of the face that are being defined.

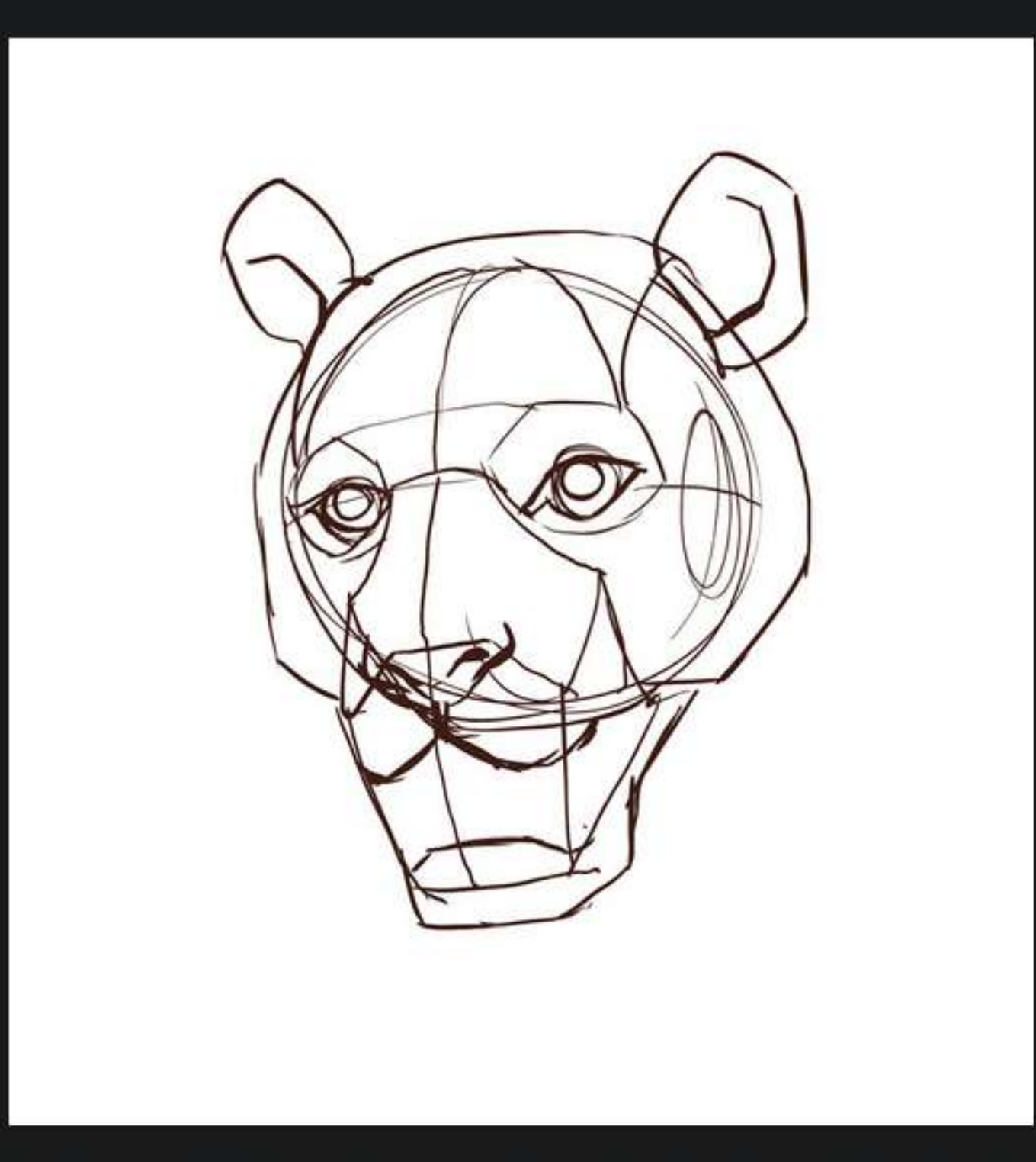


With the eye sockets complete, we can pop some eyeballs in there, which will be used later when crafting our eyelids.

The muzzle on the other hand can now be attached over our initial foot print. It's generally a fairly boxy form, with clearly separated top, side and front planes.



As I mentioned before, an animal can have all kinds of additional elements that contribute to the size of its head that we don't factor in when drawing the cranium. Here I'm adding what looks a bit like a helmet. This blocks in the general mass of fur, muscle, and whatever else that extends out from the actual skull.



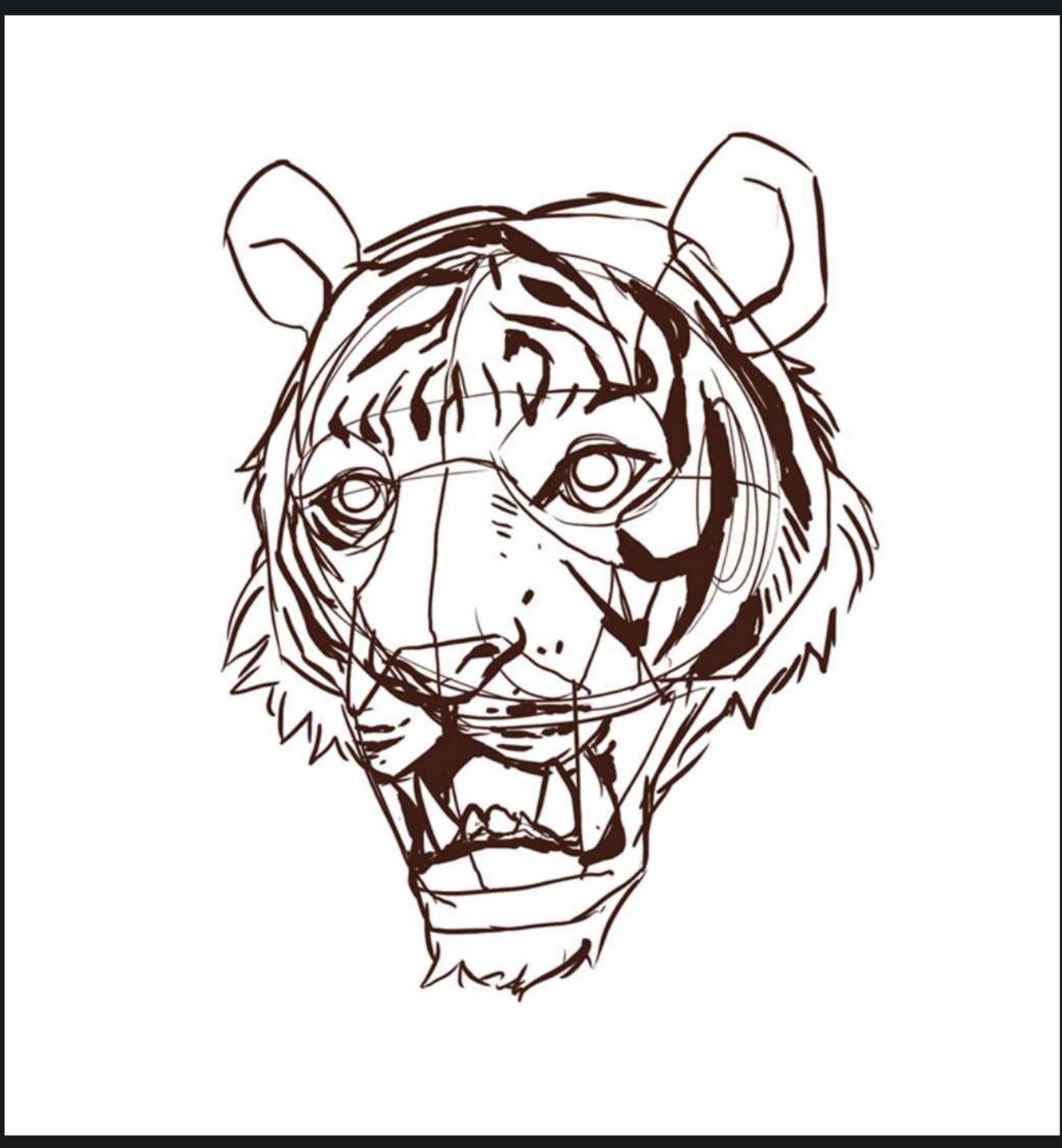
Moving forwards, we start to break down more of the forms we see in our reference, building it directly on top of the scaffolding we've created so far. At no point should you ever let go of your awareness of the major planes and angles of the face. For example, if you look at the lower jaw, while I'm getting much more complex, I'm still allowing my silhouette to turn around the clear corner that exists between the front and side of that form, as defined by the underlying construction.

Also, always consider the "footprints" that additional forms have on the existing ones. For example, the ears are not just flat shapes pinned onto the silhouette - the tiger's left ear (our right) connects to a specific location that we can see. The other one, due to the angle of the head, is connecting further back where the footprint would not be visible.

We're also building the eyelids with full awareness of the eyeball that exists underneath them. Because the lids conform to and wrap around the eyeball, having that form present beforehand is very important and serves as a helpful guide.

Lastly, an important note - when drawing eyes, or really anything that appears black in your reference image, **DO NOT FILL IT IN WITH SOLID BLACK**. I cannot stress this enough - we have an urge to fill in what we see as black, but this is no different from the orange of the tiger's fur. Just because it lines up with the colour we're drawing with does not mean that there is any benefit to filling it in. Instead, you should be treating everything in your subject matter as though it were solid white or grey.

Ultimately, as you'll see in the next image, we can decide what we want to fill in, but at this point it will rob you of some of the constructional cues that help you understand the forms you're working with, and how they relate to one another in space.



And finally, detail. Until this point, until your construction is solidly hammered out, I don't want you to be concerned with any detail and texture. Once you're satisfied with that underlying structure however, be mindful of your reference.

Every piece of detail and texture you draw should relate in some way to something you see in your reference - especially when, as in this case, we have things like stripes. You may think you understand how a tiger's stripes run over its body, but in all likelihood unless you've studied tigers for a considerable amount of time, you probably don't.

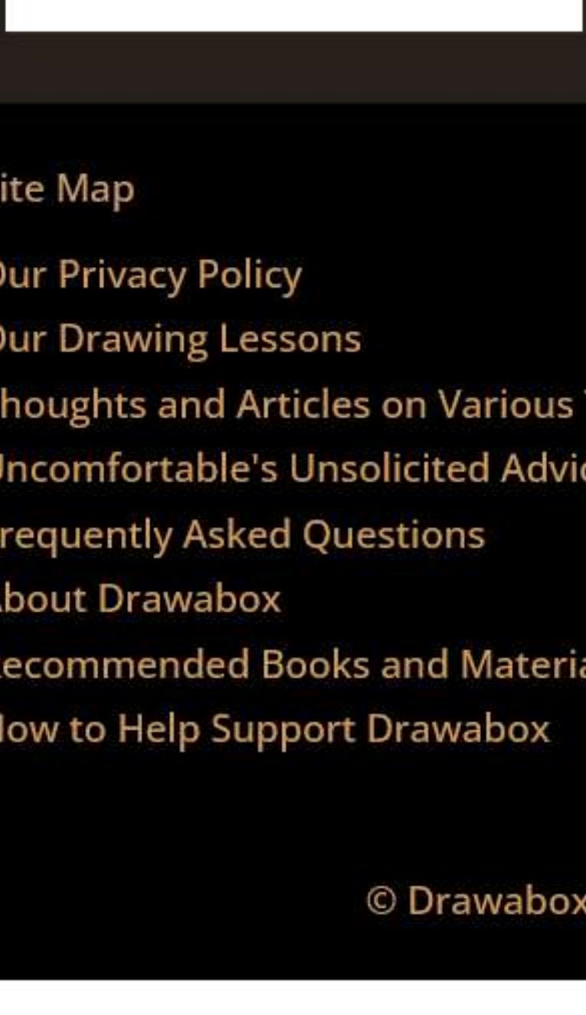
Also, when drawing fur, don't zigzag your strokes - design each individual tuft of fur with intent and care, rather than letting yourself go into autopilot. Less is always more - there's no need to go overboard with any sort of detail. Add just enough to communicate that feature's presence, and let the viewer's mind fill in the rest. Subtlety is key to a successful drawing.

<<< Wolf Demo   Video Demos >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Cottonwood Arts Sketchbooks

These are my favourite sketchbooks, hands down. Move aside Moleskine, you overpriced gimmick. These sketchbooks are made by entertainment industry professionals down in Los Angeles, with concept artists in mind. They have a wide variety of sketchbooks, such as toned sketchbooks that let you work both towards light and towards dark values, as well as books where every second sheet is a semitransparent vellum.



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Lesson 5: Applying Construction to Animals

Video Demos

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The demos listed here have no written counterpart.

Otter demo

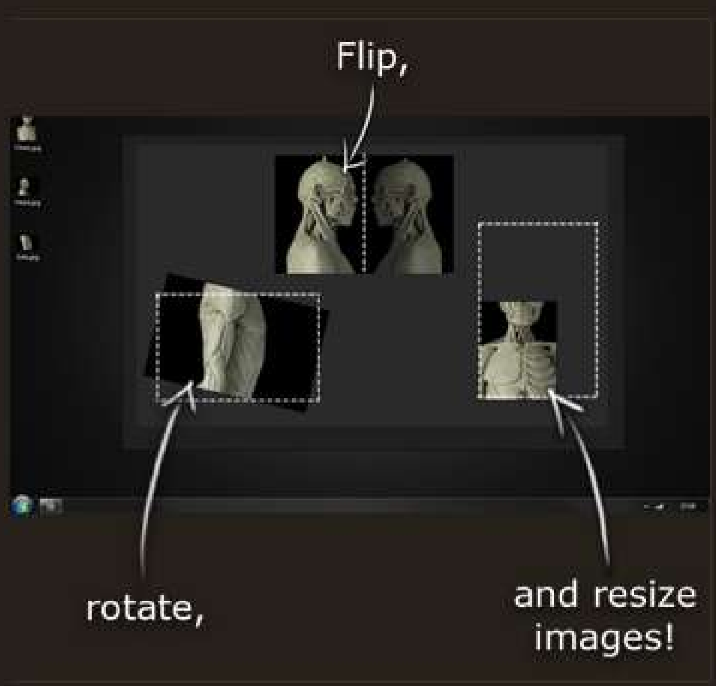
Here's a subject that you don't see drawn too often, despite being insufferably adorable. An otter.

Head construction demo

A frequent pain point for students is constructing the heads of animals, as they'll often jump into detail and forget that construction and blocking in forms applies just as much here as it does to the rest of the body.

<<< Tiger Head Demo

White Pelican Demo >>>



PureRef

This is another one of those things that aren't sold through Amazon, so I don't get a commission on it - but it's just too good to leave out. PureRef is a fantastic piece of software that is both Windows and Mac compatible. It's used for collecting reference and compiling them into a moodboard. You can move them around freely, have them automatically arranged, zoom in/out and even scale/flip/rotate images as you please. If needed, you can also add little text notes.

When starting on a project, I'll often open it up and start dragging reference images off the internet onto the board. When I'm done, I'll save out a '.pur' file, which embeds all the images. They can get pretty big, but are way more convenient than hauling around folders full of separate images.

Did I mention **you can get it for free**? The developer allows you to pay whatever amount you want for it. They recommend $5, but they'll allow you to take it for nothing. Really though, with software this versatile and polished, you really should throw them a few bucks if you pick it up. It's more than worth it.

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Lesson 5: Applying Construction to Animals

White Pelican Demo

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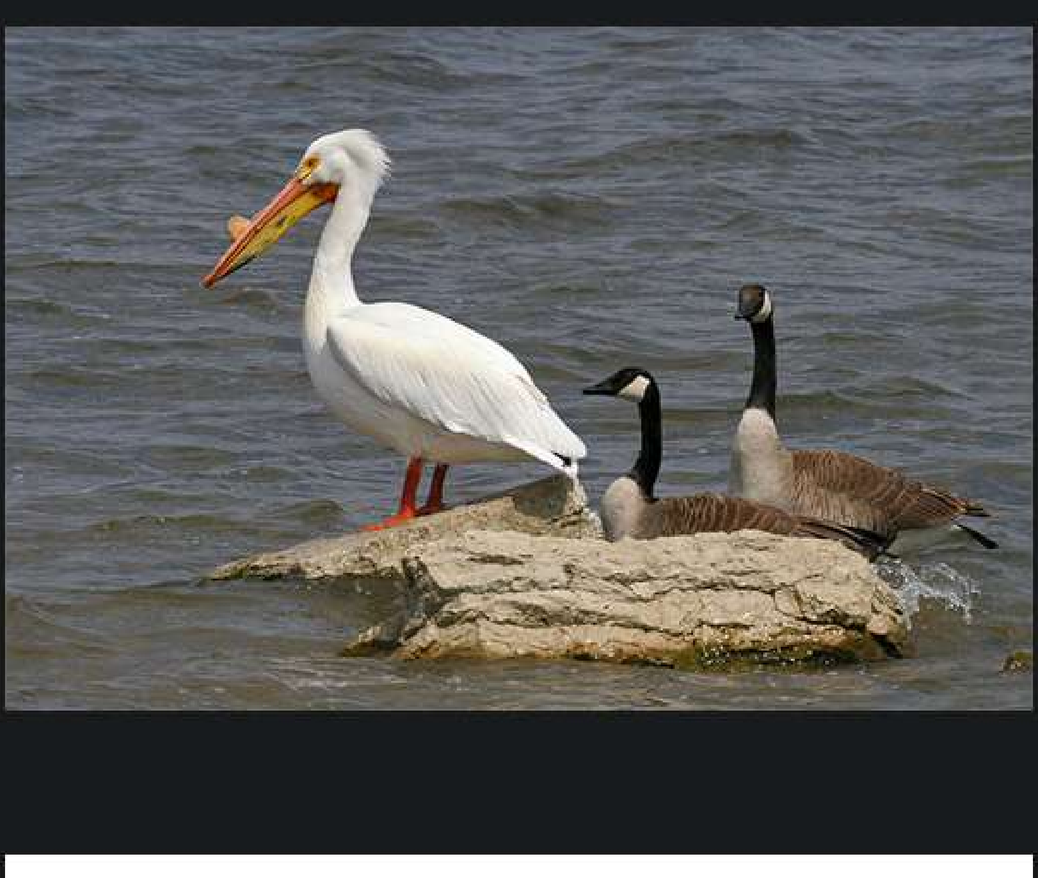
This demo is a little older, having been published in August 2016. As such, while I have decided that there is still something of value here, any techniques or approaches outlined in demonstrations not flagged with this message should be considered to take precedence over what is covered here. This is a natural part of Drawabox being an evolving, growing resource.

Demo Video

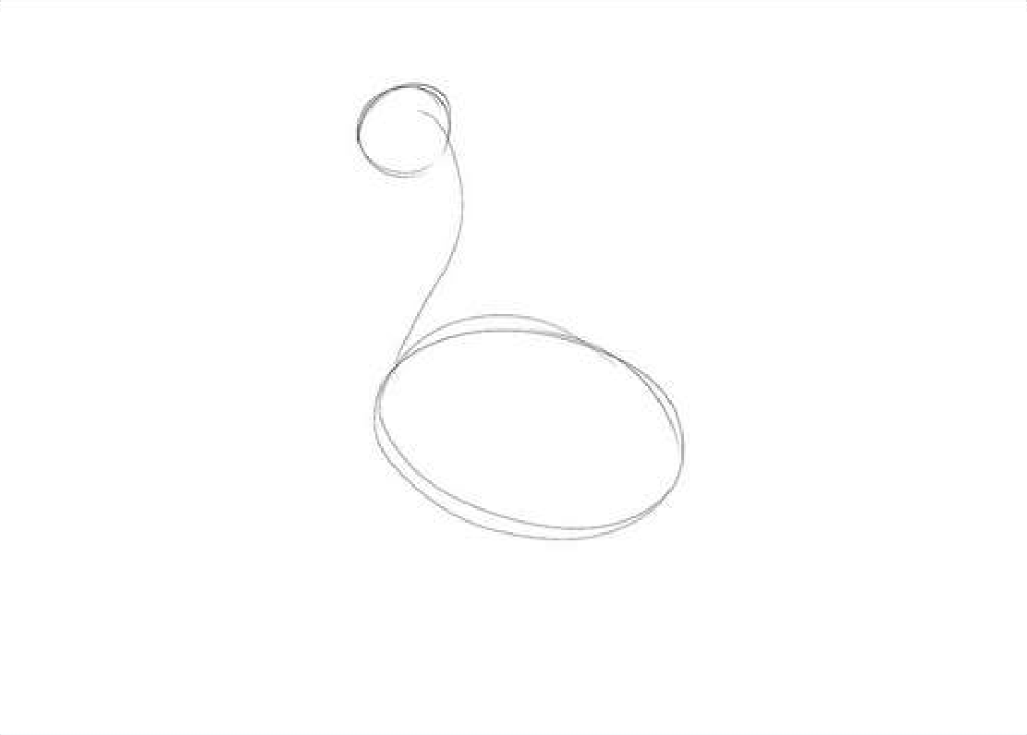
Birds are a great place to start, especially since they are somewhat simpler and easier to approach, with their ribcage and pelvis effectively being compressed into a single mass.

This demo recording has no accompanying audio commentary.



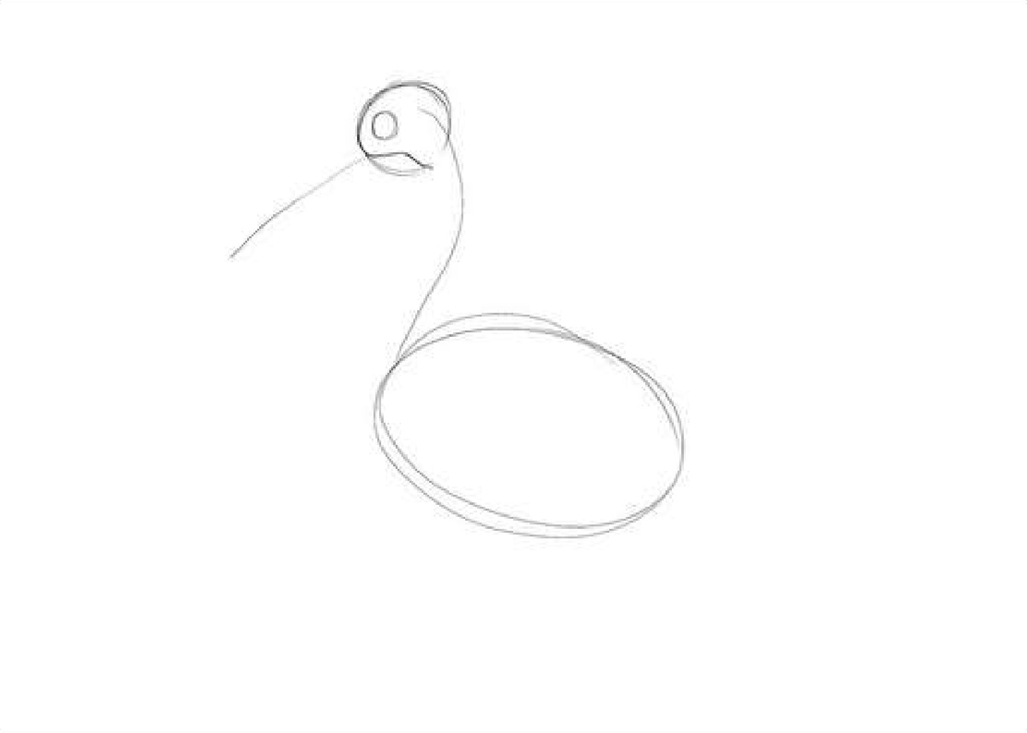
Reference

Here's the reference image we'll be using for this demonstration.

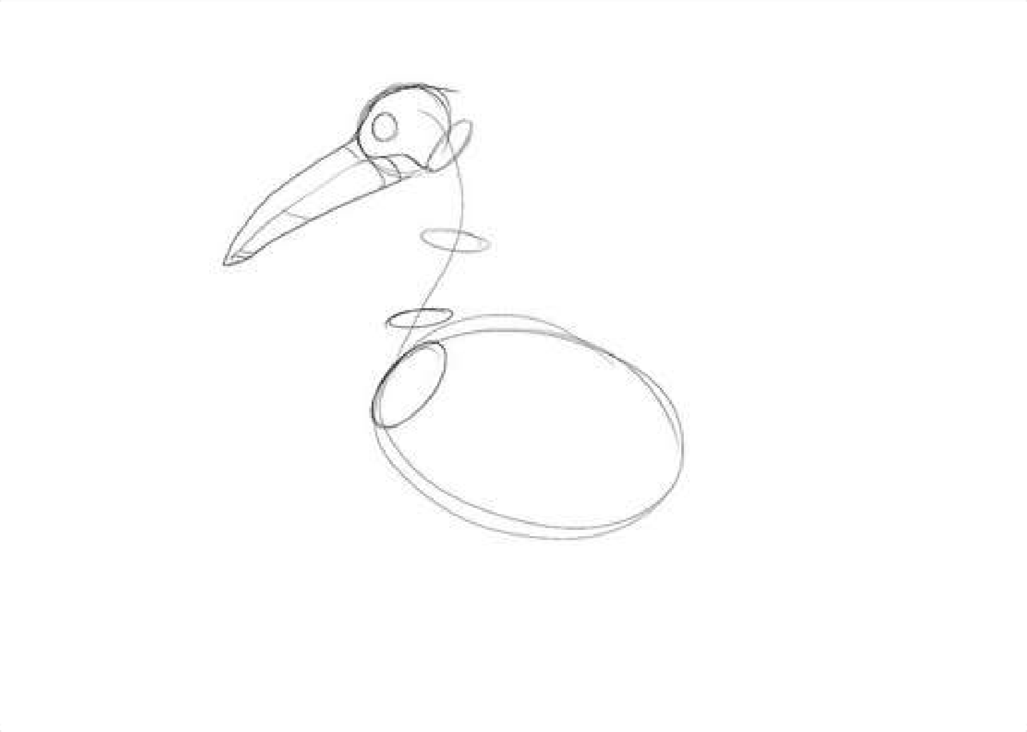


Step by step

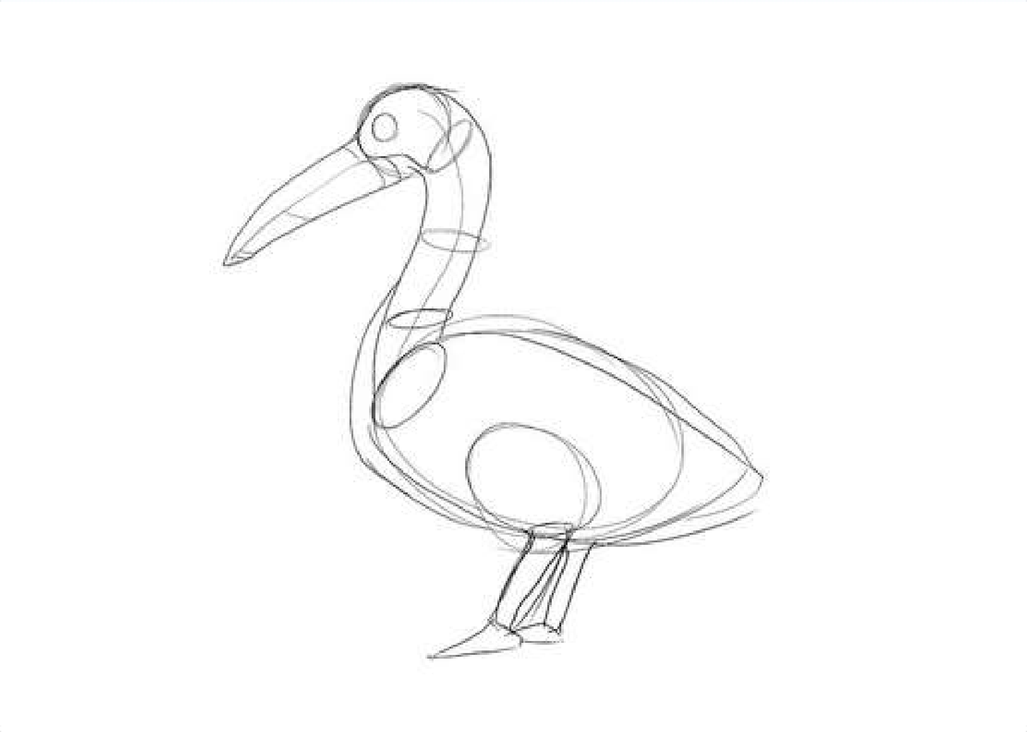
As I mentioned above, we've simplified the torso into a single mass, rather than splitting them into ribcage and pelvis. Keep in mind that the masses you see here are not flat, 2D shapes. They are 3D forms. Of course, the only difference is in how you choose to perceive them, as the outline of a 3D ball will still be drawn as an ellipse. If you're not entirely comfortable with this, you may choose to add one or two contour curves to help reinforce the illusion, but don't go overboard and make sure you're not sloppy in their execution.



This is a small step, but I wanted to focus on how the base of the beak there wraps around the ball of the cranium where it connects to the head. Being mindful of this curvature is extremely important, and if you don't properly perceive the illusion of that cranial mass being a 3D ball, you will not draw this curve correctly. Always remind yourself that we are dealing in three dimensional forms. Additionally, you can see that I've added an eye socket, and I've roughly gauged how long my beak is going to be.



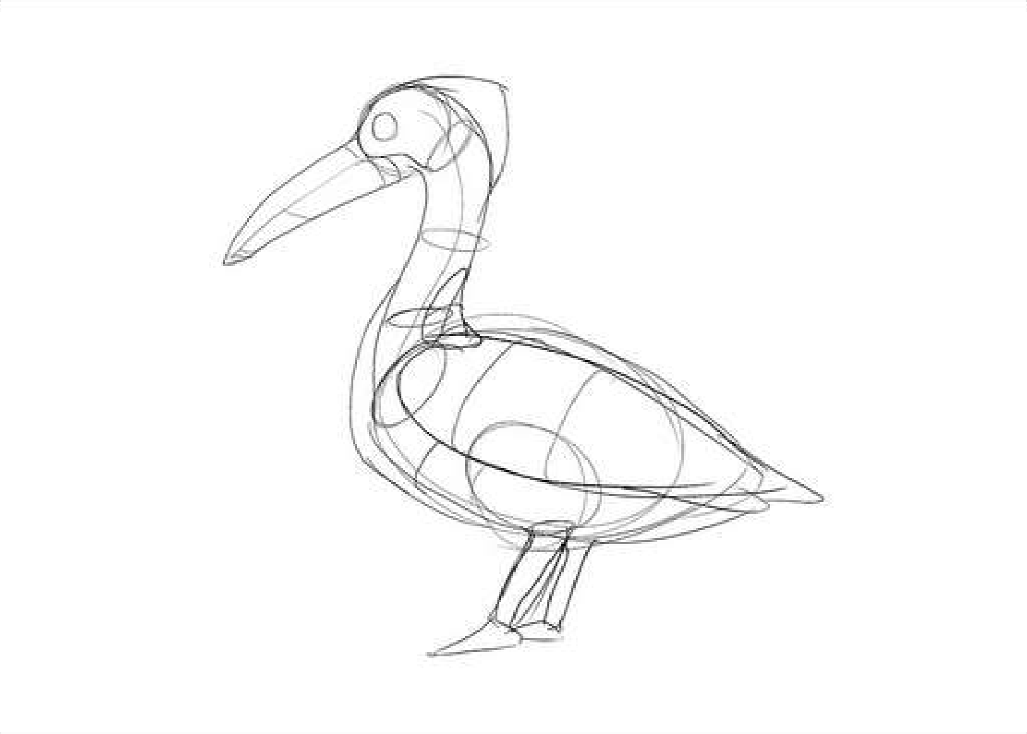
I've fleshed out the rest of the beak, adding a couple of little contour curves to help maintain the illusion of form. Additionally, I'm using a similar technique with the neck as I introduced in lesson 3, when dealing with stems and branches. That is, placing a couple of ellipses along the length in order to give myself some targets to hit when I construct the edges of the tube. I've also distinctly defined how that neck-tube is going to connect to the torso. Think of it as a headphone jack. You're setting out the hole, so you know exactly where to plug the neck in.



So I've played connect-the-dots with the neck ellipses and constructed that tube. I've also added the remaining major forms - that is, the thigh masses, the legs and the feet.

Admittedly I put the legs way too close together, but these mistakes do happen, and when they do, just keep pushing forwards. You'll notice that the thighs are not visible at all in the drawing. That is, they're there, but you can't make them out and differentiate them from the rest of the torso, because of how the feathers all blend everything together.

It is entirely necessary however for us to understand what is going on underneath the skin - having eaten many a bird in my long life, I am all too well aware of their juicy, succulent thigh-meats, so how could I refrain from including them? Draw on all of your experiences, and feed your curiosity. Study and observe everything around you, as this information will prove to be very valuable in pushing the believability of your drawings in the most unexpected of ways.



Looking closely at the reference image, you'll see that there's a few other forms that we were missing - the wing's a big one, but there's also the transition between the back of the neck and the torso, something easily missed. With the wing, I felt it especially important to separate that form from the rest of the torso, so I leveraged a couple of contour curves here to help puff it out.

Since you're this far through the lessons, you know how I feel about detail - it's not that important. It's really where you can let your observational skills shine the most, since you can worry a lot less about constructing everything, and behave more like a mindless photocopier. Just make sure you don't go overboard, as it's very easy to lose track of the underlying forms. Less is always more with this sort of thing.

I'm leaving the actual image for this section out, so students focus on the forms established in the previous step.

<<< Video Demos

Informal Demos >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

WHAT THE HELL AM I SUPPOSED TO DRAW?!

The Science of Deciding What You Should Draw

Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

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Lesson 5: Applying Construction to Animals

Informal Demos

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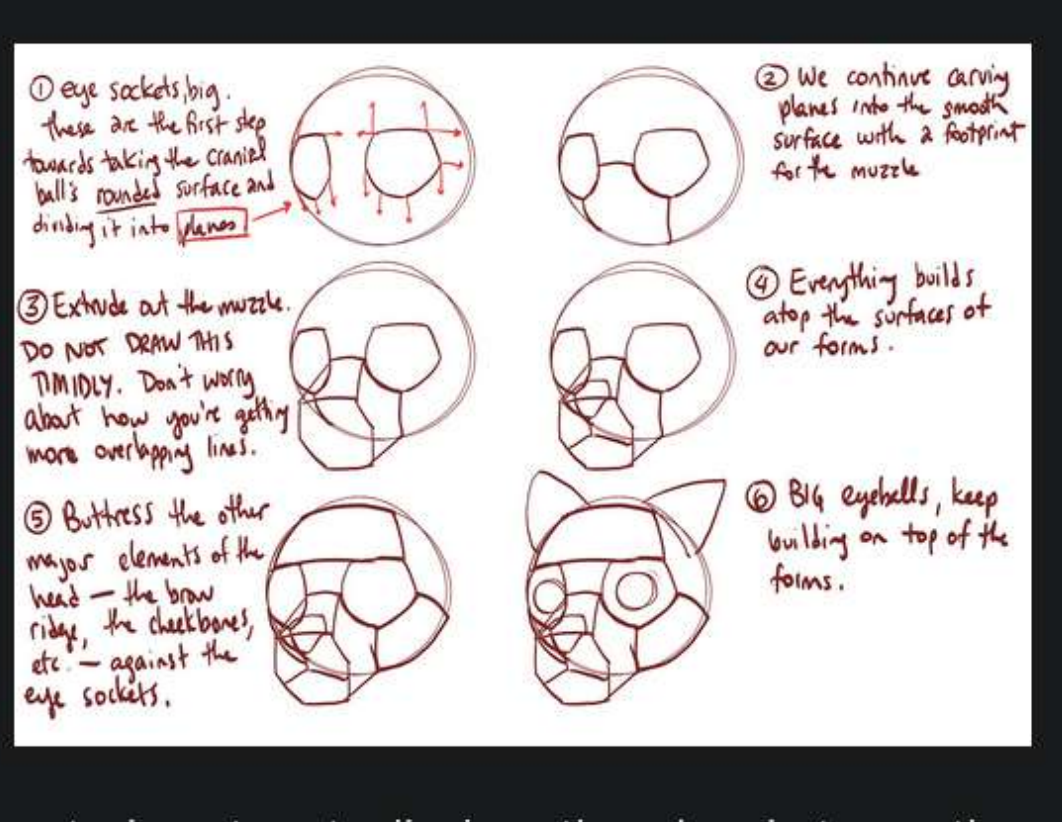
LISTEN WITH DRAWABOX

The demos here have been drawn in the course of a student's homework critique, but contain information that can be useful to all working through this material.

It is important to keep in mind that these demonstrations have been done over the course of years. Given that the specific aspects of the lesson have changed over time as the material has been rewritten to either clarify or further develop how certain principles are applied, the older the demonstrations get, the more likely they are to have elements that are no longer fully consistent with how the material is covered now.

Be sure to look at the demonstrations critically - if they're listed here, they are done so because they are still of value, in some area or another. That said, if they contradict principles stressed in a more recent demonstration, remember that the more recent demonstration will always supplant the older.

The demonstrations higher in the list are newer, those further down are older.


① eye sockets, big. these are the first step towards taking the cranial ball's rounded surface and dividing it into planes
② We continue carving planes into the smooth surface with a footprint for the muzzle
③ Extrude out the muzzle. DO NOT DRAW THIS TIMIDLY. Don't worry about how you're getting more overlapping lines.
④ Everything builds atop the surfaces of our forms.
⑤ Buttress the other major elements of the head — the brow ridge, the cheekbones, etc. — against the eye sockets.
⑥ BIG eyeballs, keep building on top of the forms.

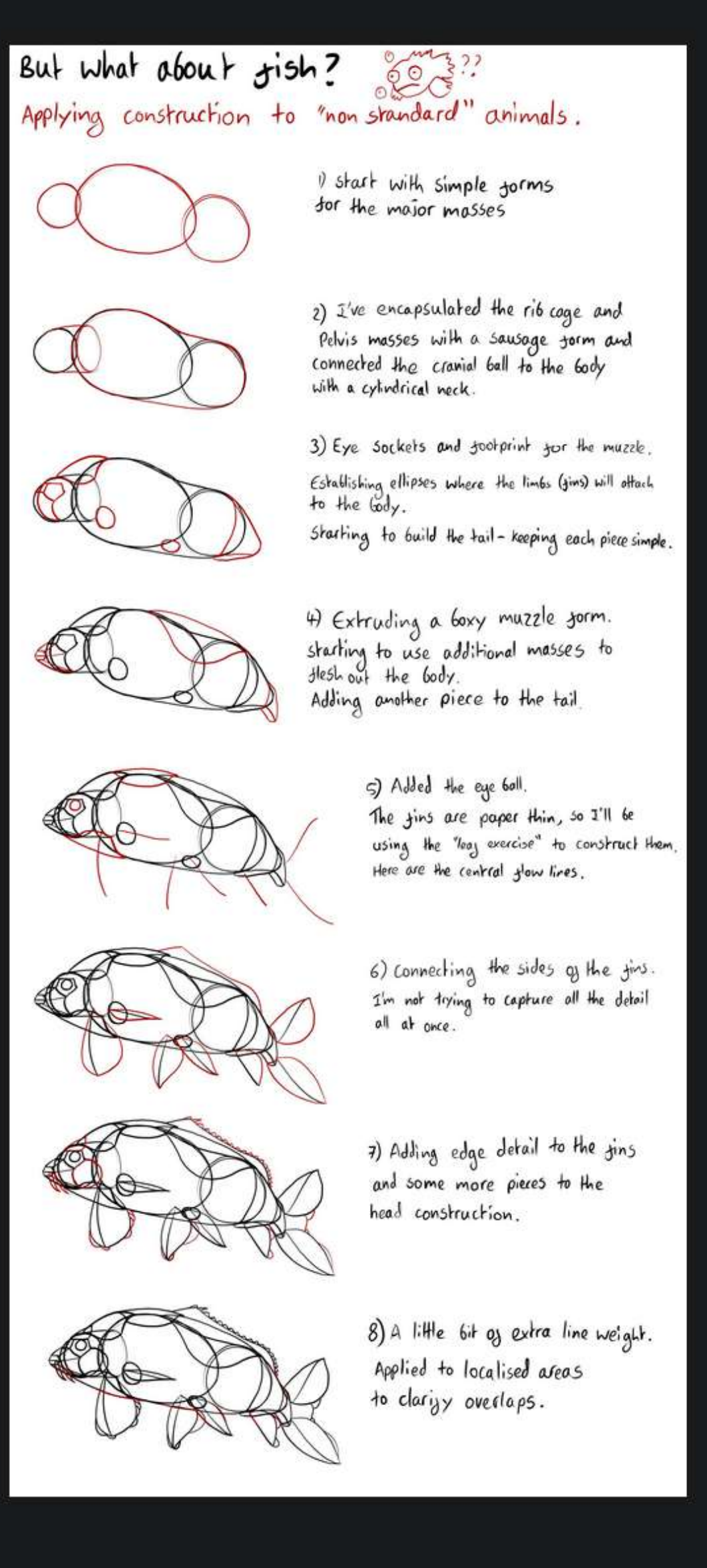
How to think about head construction

The eye sockets are an *incredibly* important part of head construction, and often students will draw them too small, or without enough care to properly reflect this.

The cranial ball we start with is a rounded, smooth surface. Heads, however - regardless of species, with humans included - are actually a combination of flatter planes. The trick to head construction is figuring out how to build up to the correct arrangement of flat planes. Figuring out where to actually draw the edges between them.

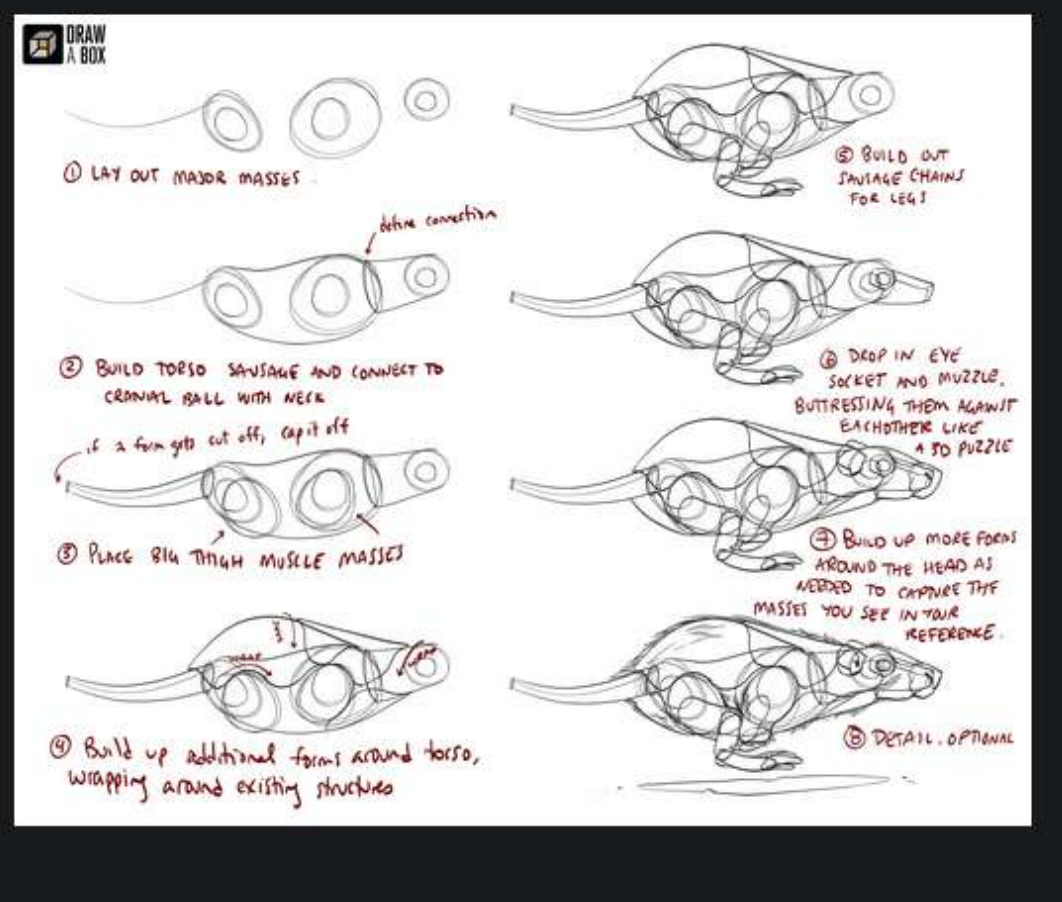
The eye sockets are our first introduction to straight(-ish) edges, taking an otherwise rounded ball and laying the groundwork for separating it into a series of planes. Once in place, we can start connecting the other facial elements to it - a footprint for the muzzle, which can then be extruded out, as well as the brow ridge and the cheekbones.

All these pieces fit snugly to one another, rather than floating loosely without any clear relationships. The head is a three dimensional puzzle, and once completed, you can think of each of these forms as chunks that fit perfectly into one another, all buttressing around the eye socket.


But what about fish??
Applying construction to "non standard" animals.
1) start with simple forms for the major masses
2) I've encapsulated the rib cage and pelvis masses with a sausage form and connected the cranial ball to the body with a cylindrical neck.
3) Eye sockets and footprint for the muzzle. Establishing ellipses where the limbs (fins) will attach to the body. Starting to build the tail - keeping each piece simple.
4) Extruding a boxy muzzle form. starting to use additional masses to flesh out the body. Adding another piece to the tail.
5) Added the eye ball. The fins are paper thin, so I'll be using the "leaf exercise" to construct them. Here are the central flow lines.
6) Connecting the sides of the fins. I'm not trying to capture all the detail all at once.
7) Adding edge detail to the fins and some more pieces to the head construction.
8) A little bit of extra line weight. Applied to localised areas to clarify overlaps.

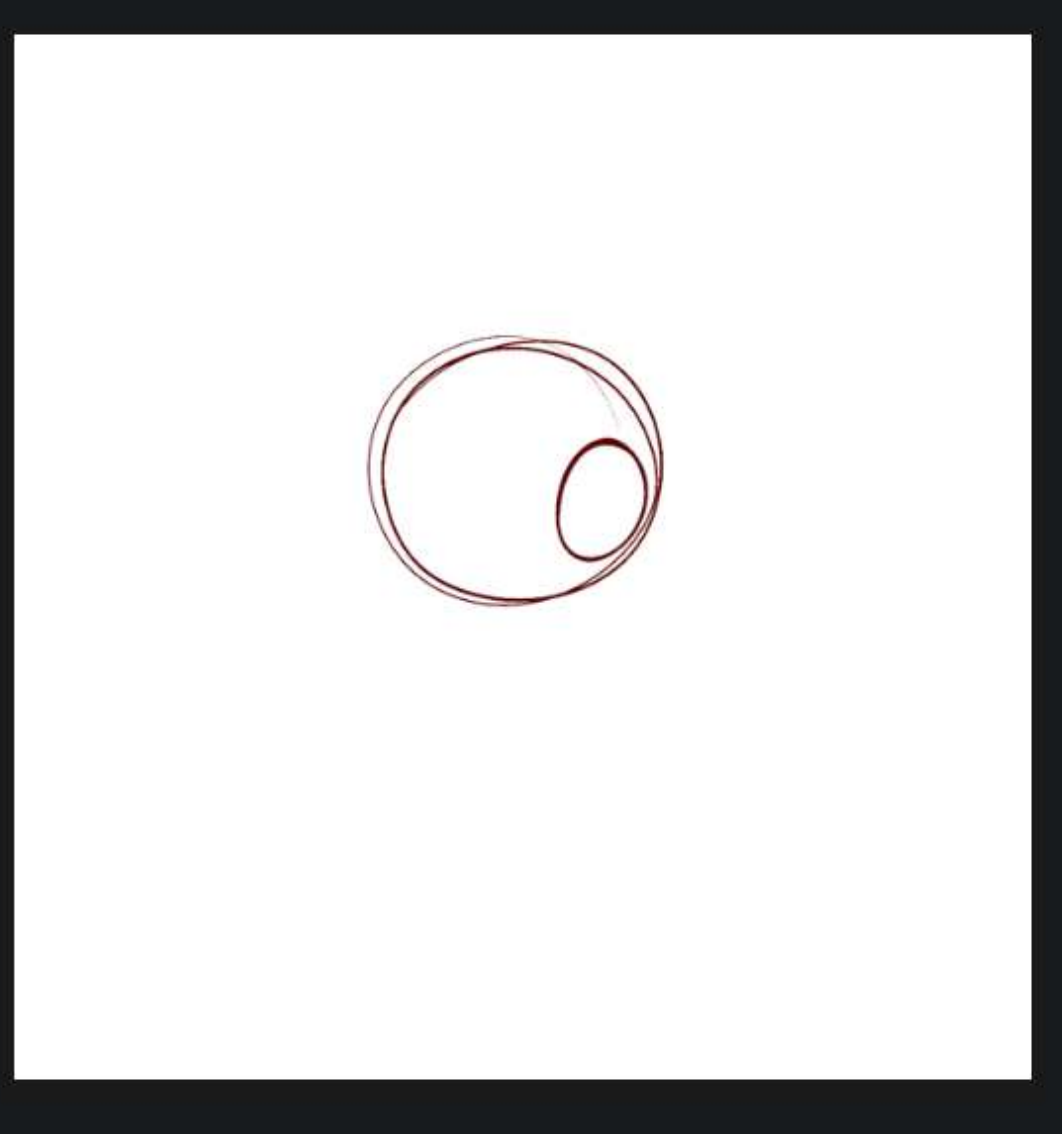
Applying construction to "non-standard" animals

This carp demonstration by our teaching assistant DIO delves into how the concepts we use on the animals in the demo can be applied to other cases that may seem wildly different, but are still ultimately made up of the same kind of pieces.


① LAY OUT MAJOR MASSES
② BUILD TORSO SAUSAGE AND CONNECT TO CRANIAL BALL WITH NECK
③ PLACE BIG THIGH MUSCLE MASSES
④ Build up additional forms around torso, wrapping around existing structure
⑤ BUILD OUT SAUSAGE CHAINS FOR LEGS
⑥ DROP IN EYE SOCKET AND MUZZLE, BUTTRESSING THEM AGAINST EACH OTHER LIKE A 3D PUZZLE
⑦ BUILD UP MORE FORMS AROUND THE HEAD AS NEEDED TO CAPTURE THE MASSES YOU SEE IN YOUR REFERENCE.
⑧ DETAIL, OPTIONAL

Running rat

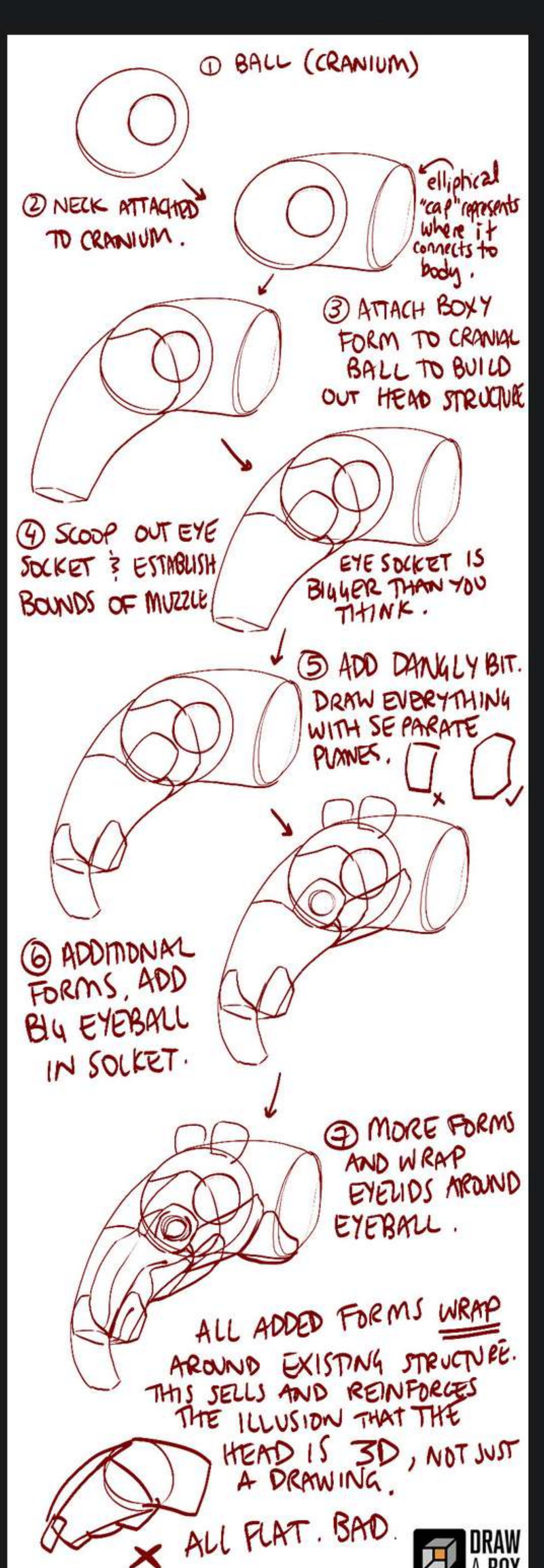
A quick demo construction of a rat.



Moose head construction gif

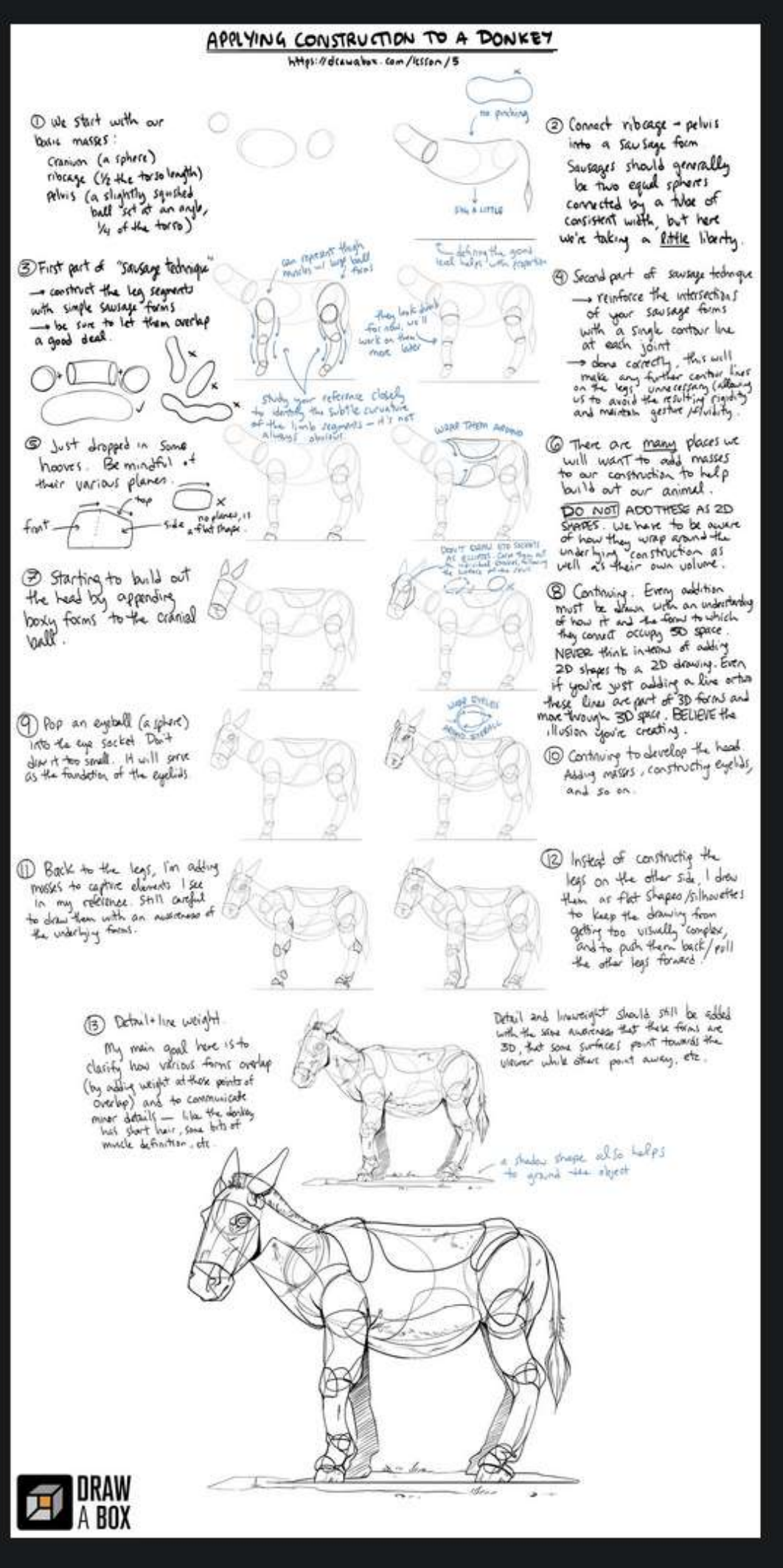
I didn't add the notes here that I do to most of my demonstrations, but I felt watching the construction of a moose's head come together as a gif might also be helpful.

Pay attention to how, especially around the muzzle, every mark I put down follows the surface, curvature, and plane distinctions of the form beneath it. This allows additional masses to wrap around the more basic structure in a way that further reinforces, rather than undermines, the illusion that this construction is three dimensional.


① BALL (CRANIUM)
② NECK ATTACHED TO CRANIUM.
elliptical "cap" represents where it connects to body.
③ ATTACH BOXY FORM TO CRANIAL BALL TO BUILD OUT HEAD STRUCTURE
④ SCOOP OUT EYE SOCKET & ESTABLISH BOUNDS OF MUZZLE
EYE SOCKET IS BIGGER THAN YOU THINK.
⑤ ADD DANGLY BIT. DRAW EVERYTHING WITH SEPARATE PLANES.
⑥ ADDITIONAL FORMS, ADD BIG EYEBALL IN SOCKET.
⑦ MORE FORMS AND WRAP EYELIDS AROUND EYEBALL.
ALL ADDED FORMS WRAP AROUND EXISTING STRUCTURE. THIS SELLS AND REINFORCES THE ILLUSION THAT THE HEAD IS 3D, NOT JUST A DRAWING.
ALL FLAT. BAD.
DRAW A BOX

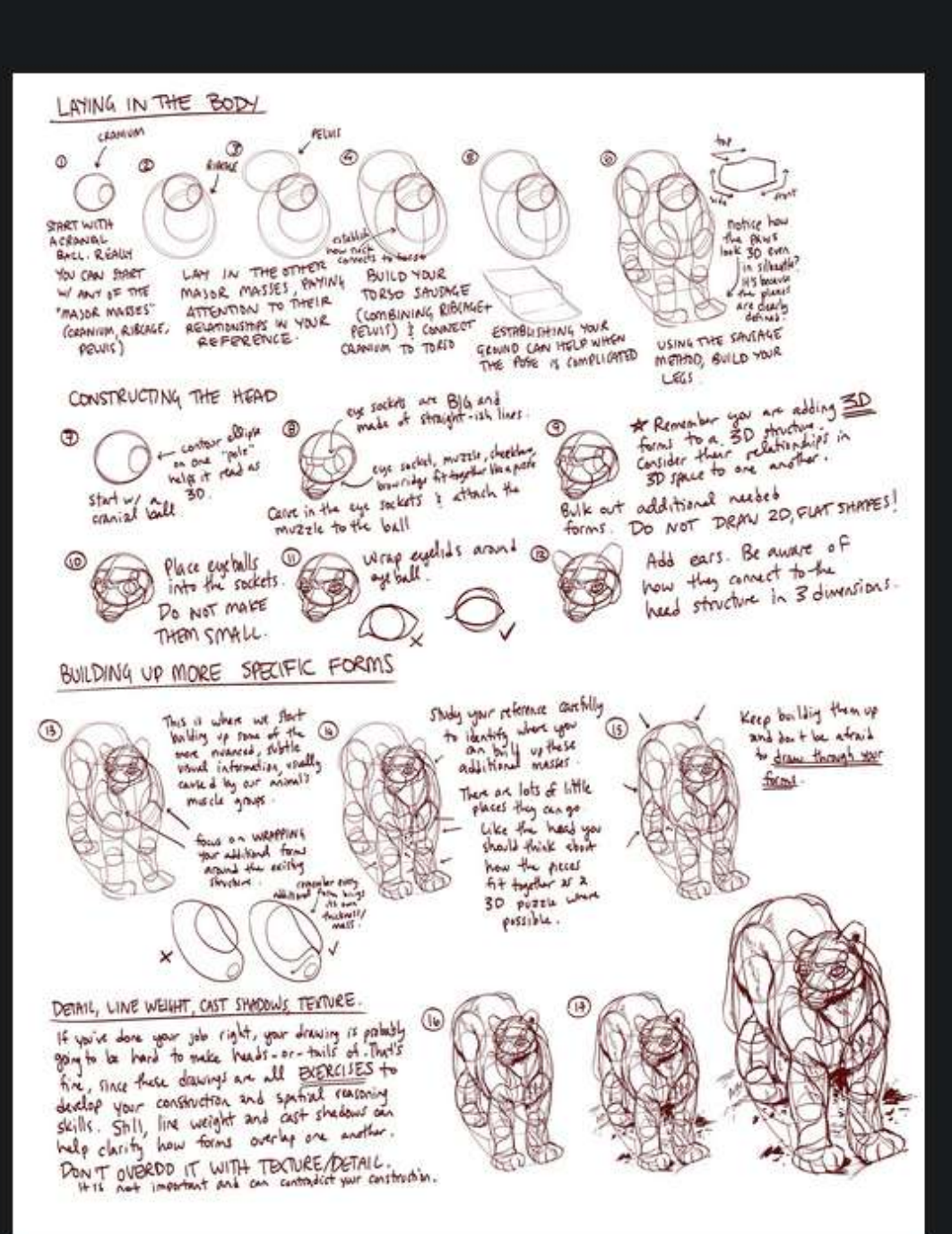
Tapir head construction

Tapirs have pretty strange heads, but they can still use the same principles we use for any other construction. The key is to remember that they are all made up of 3D forms, and to think of your forms as having planes - a top, a side, a front, a bottom, etc. Don't just stamp them on top as flat shapes.


APPLYING CONSTRUCTION TO A DONKEY
DRAW A BOX

Donkey construction

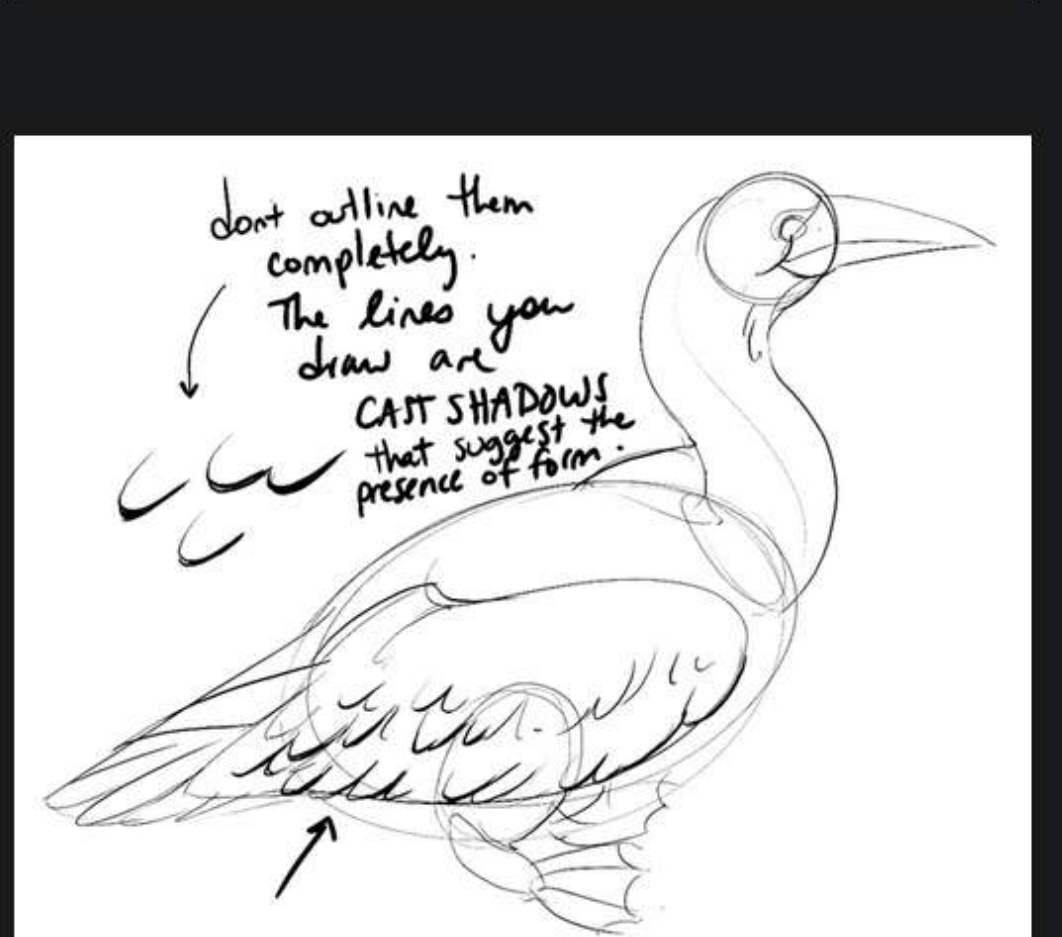
This is a pretty detailed demonstration I did for a student who was struggling with the lesson, picking on a donkey in particular. It focuses on all major elements of construction as applied to animals - the basic masses, the use of sausage forms for limbs and torso, the adding of further organic masses that conform to the structure underneath them, etc.


LAYING IN THE BODY
CONSTRUCTING THE HEAD
BUILDING UP MORE SPECIFIC FORMS
DETAIL, LINE WEIGHT, CAST SHADOWS, TEXTURE
DON'T OVERDO IT WITH TEXTURE/DETAIL.

Puma construction

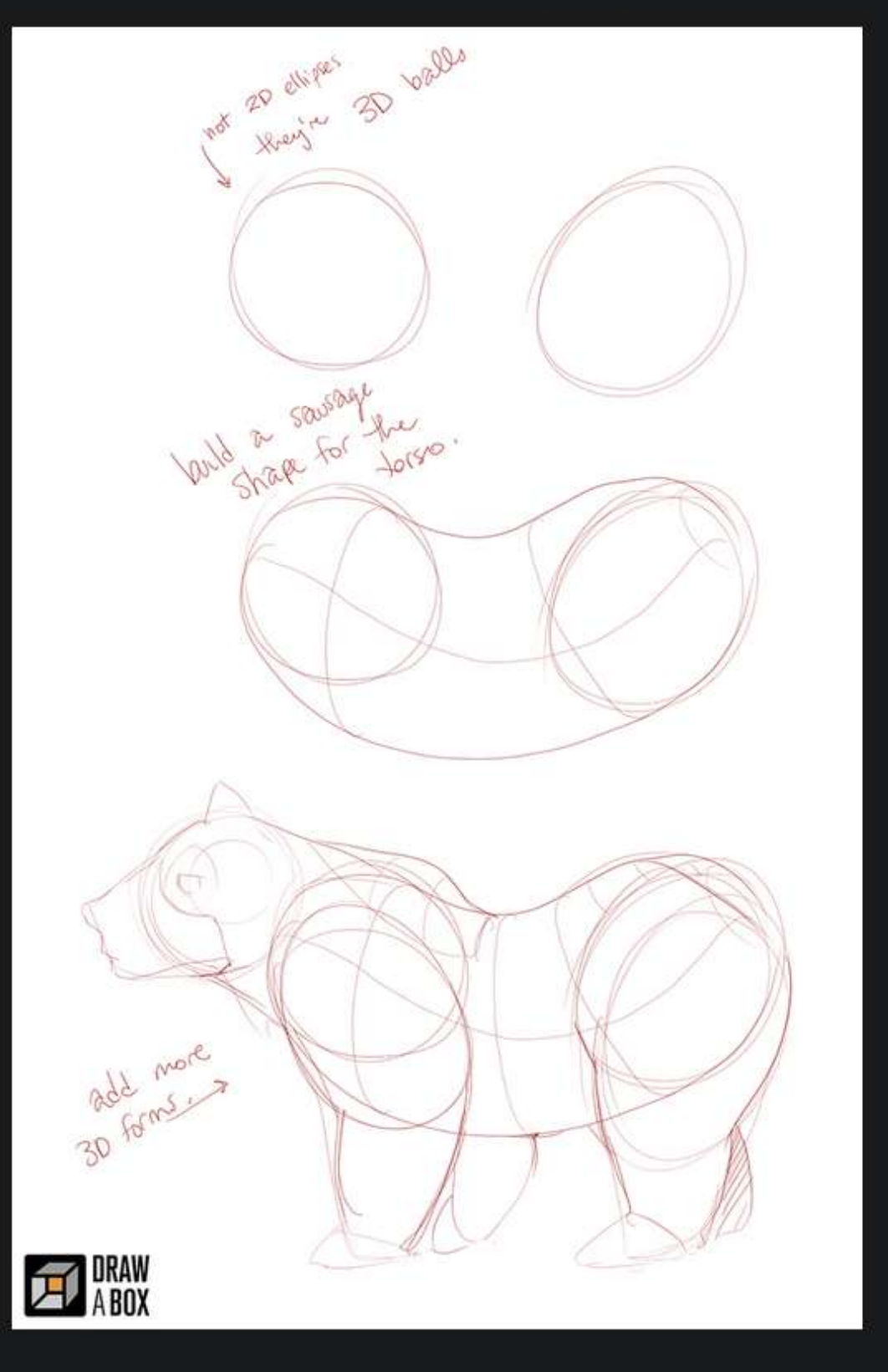
This one is an analysis of how to construct a puma in a particularly difficult orientation. You'll notice a lot of animal studies look more from the side, yet here not only is the subject in more of a three quarter view, but it's also got its hindquarters in a higher position. Our Discord community came to know this one as the "drama puma", and for those reasons it's a real challenge.

It's also a great example of how all of the drawings we do for this course are *exercises*. The end result is still pretty messy and confusing, but going through this process can teach you a lot about the nature of the forms that make up this complex animal.


dont outline them completely. The lines you draw are CAST SHADOWS that suggest the presence of form.

Using cast shadows

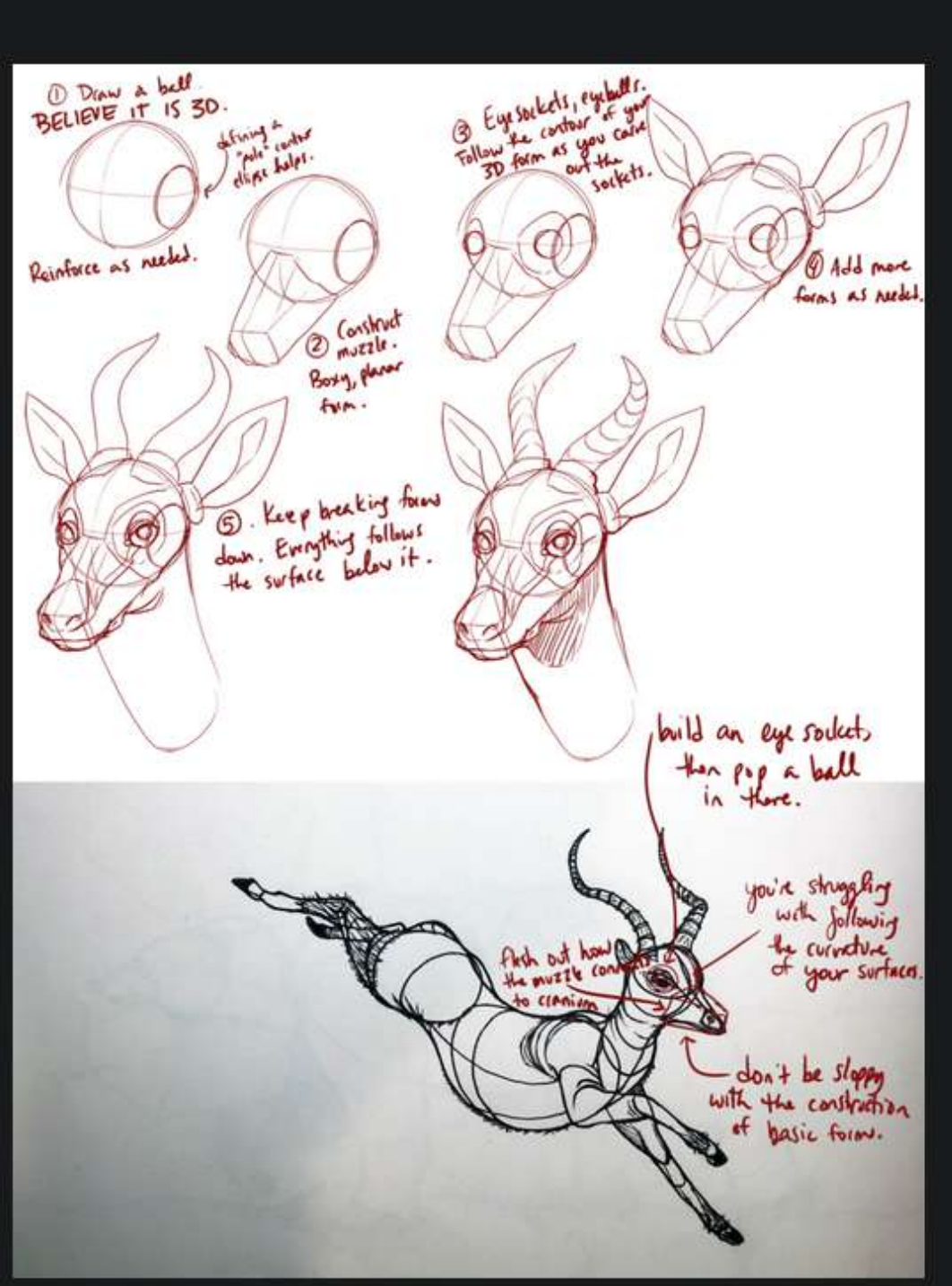
As we've discussed back in lesson 2 when talking about texture and detail, cast shadows are king. This is just a basic example of how you can convey simple feathers by capturing a few of the shadows that they cast on each other.


not 2D ellipses they're 3D balls
build a sausage shape for the torso.
add more 3D forms
DRAW A BOX

The torso sausage

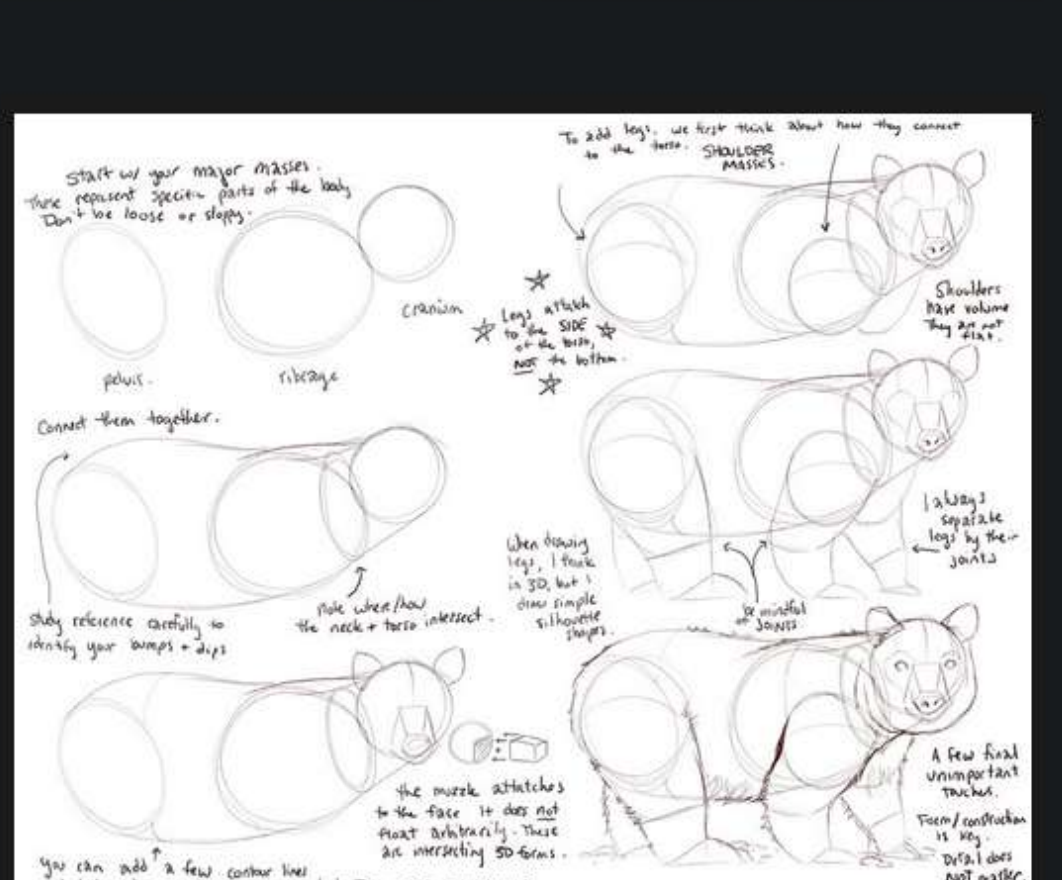
The torso-sausage is the core of any animal, and quite easy to construct. In this demo I actually drew the ribcage way too small, but ignoring that, look at how the sausage is like a water balloon that is being held up by these two solid masses inside of it. The middle sags in the middle, and it remains relatively rounded and simple, conveying solidity and volume.

While a lot of animals will have visible masses and bulk along their spines (on the top), I still construct them in this manner, only adding the additional bulk after the fact similarly to the organic intersections from lesson 2.


① Draw a ball BELIEVE IT IS 3D.
Reinforce as needed.
② Construct muzzle. Boxy, planar form.
③ Eye sockets, eyeballs. Follow the contour of your 3D form as you carve out the sockets.
④ Add more forms as needed.
⑤ Keep breaking forms down. Everything follows the surface below it.
build an eye socket, then pop a ball in there.
you're struggling with following the curvature of your surface.
don't be sloppy with the construction of basic forms.

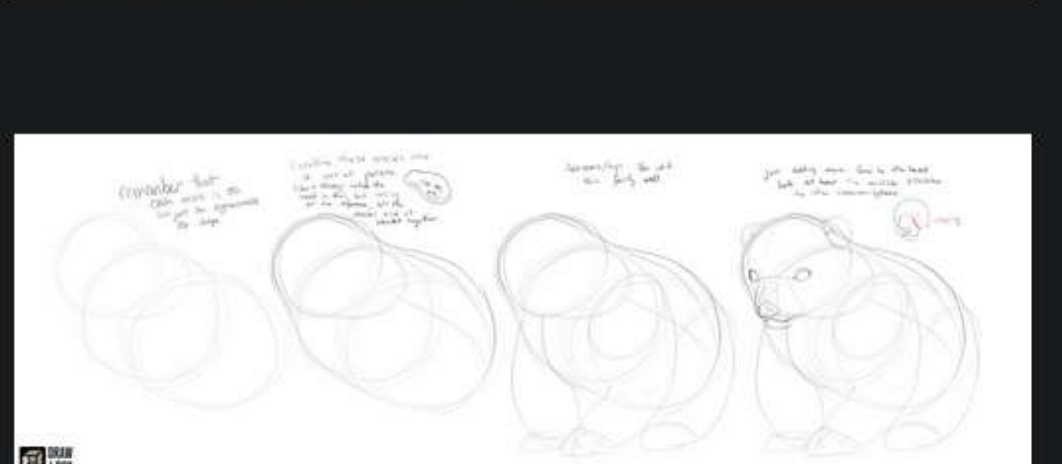
Gazelle head construction

An analysis of how I would gradually build up the construction of this gazelle's head.



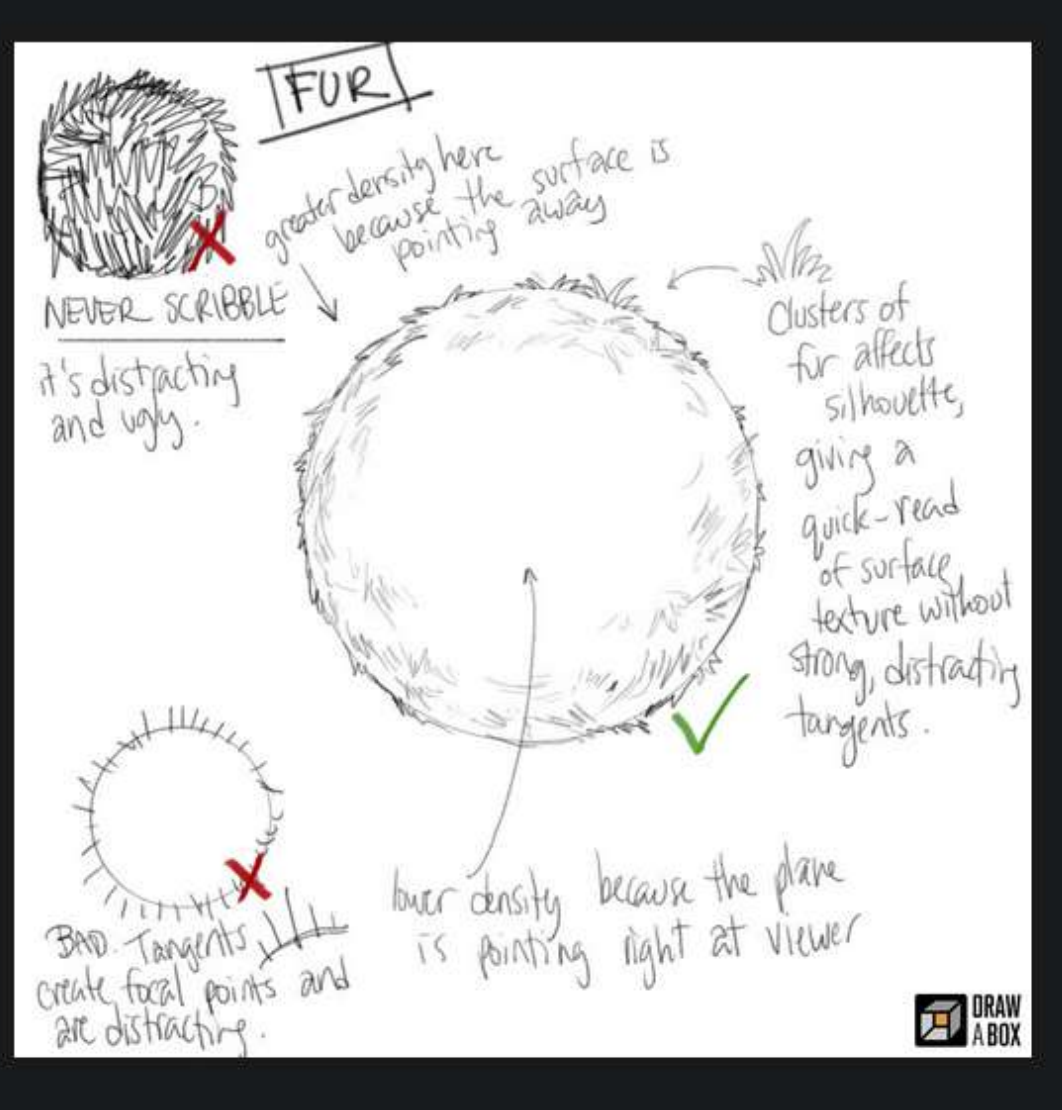
Bear construction

This one's pretty old, but it still shows the principles of construction fairly well. Note that I haven't used the sausage method for the legs, but I'm still applying a lot of the same concepts.



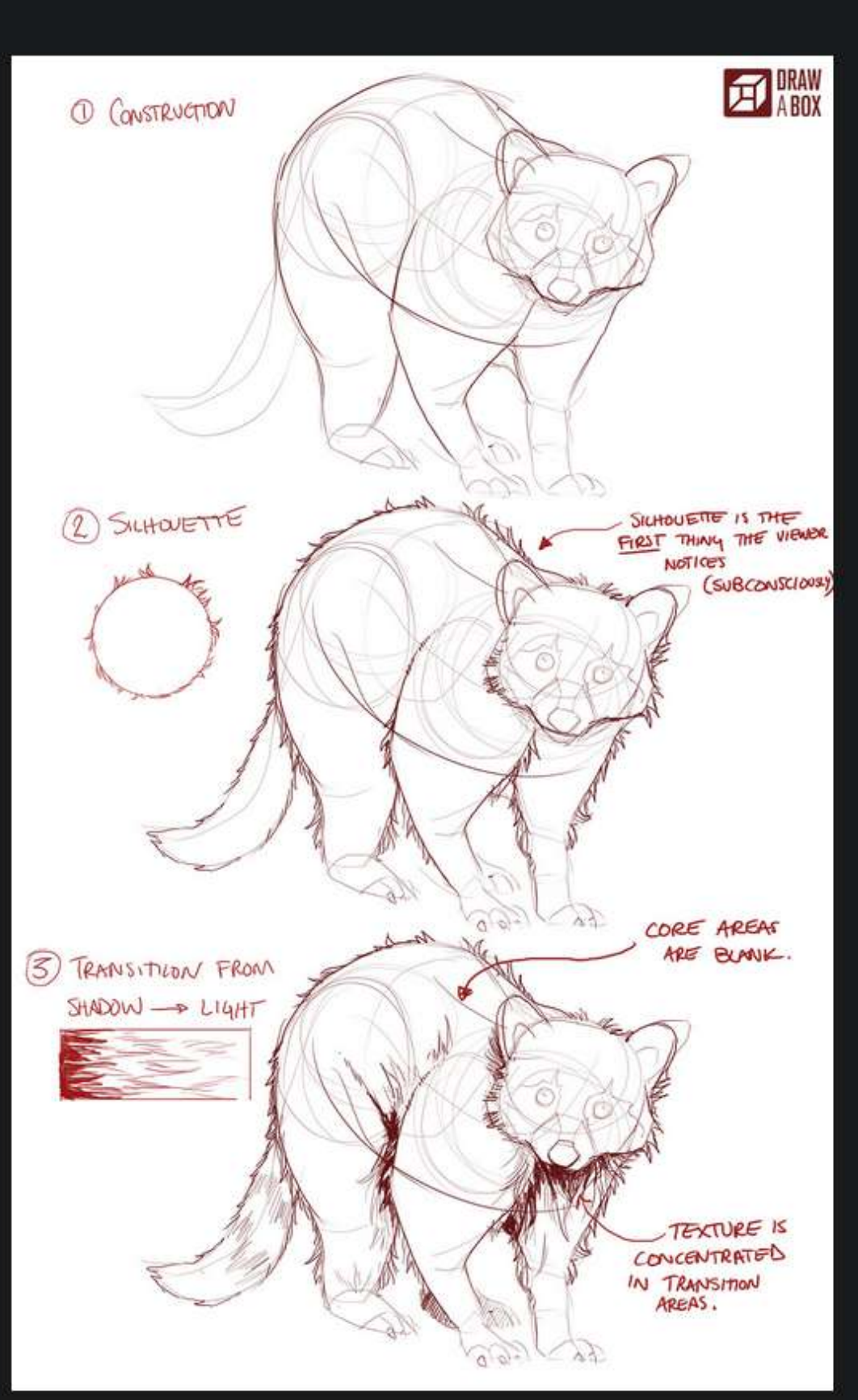
Bear cub construction

This one's very old, but I feel like the way it accentuates the volumes and general gestural nature of the legs still makes it valuable in some ways. There is a lot to be learned here, just don't let it cause you to stray from the techniques covered in the main lesson and demos.


FUR
NEVER SCRIBBLE. it's distracting and ugly.
greater density here because the surface is pointing away
Clusters of fur affects silhouette, giving a quick-read of surface texture without strong, distracting tangents.
BAD Tangents create focal points and are distracting.
lower density because the plane is pointing right at viewer
DRAW A BOX

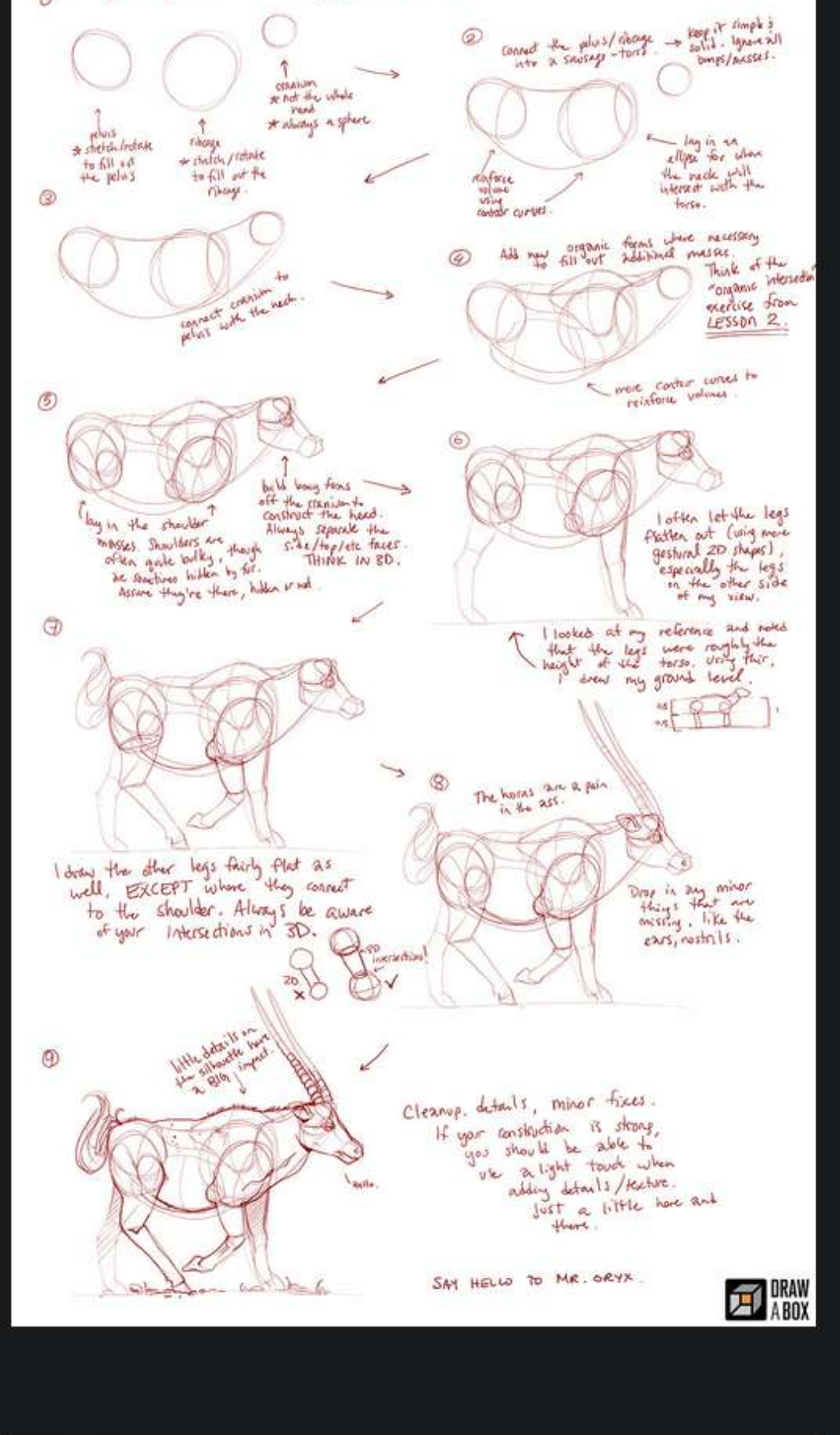
Fur

When tackling fur, make sure that you're not going into auto-pilot, trying to cover your silhouette in zigzags. Add specific, intentional, **designed** tufts of fur along the silhouette. This is what is going to carry the majority of the illusion of fur - you don't even have to put that much.


① CONSTRUCTION
② SILHOUETTE
SILHOUETTE IS THE FIRST THING THE VIEWER NOTICES (SUBCONSCIOUS)
③ TRANSITION FROM SHADOW → LIGHT
CORE AREAS ARE BLANK.
TEXTURE IS CONCENTRATED IN TRANSITION AREAS.
DRAW A BOX

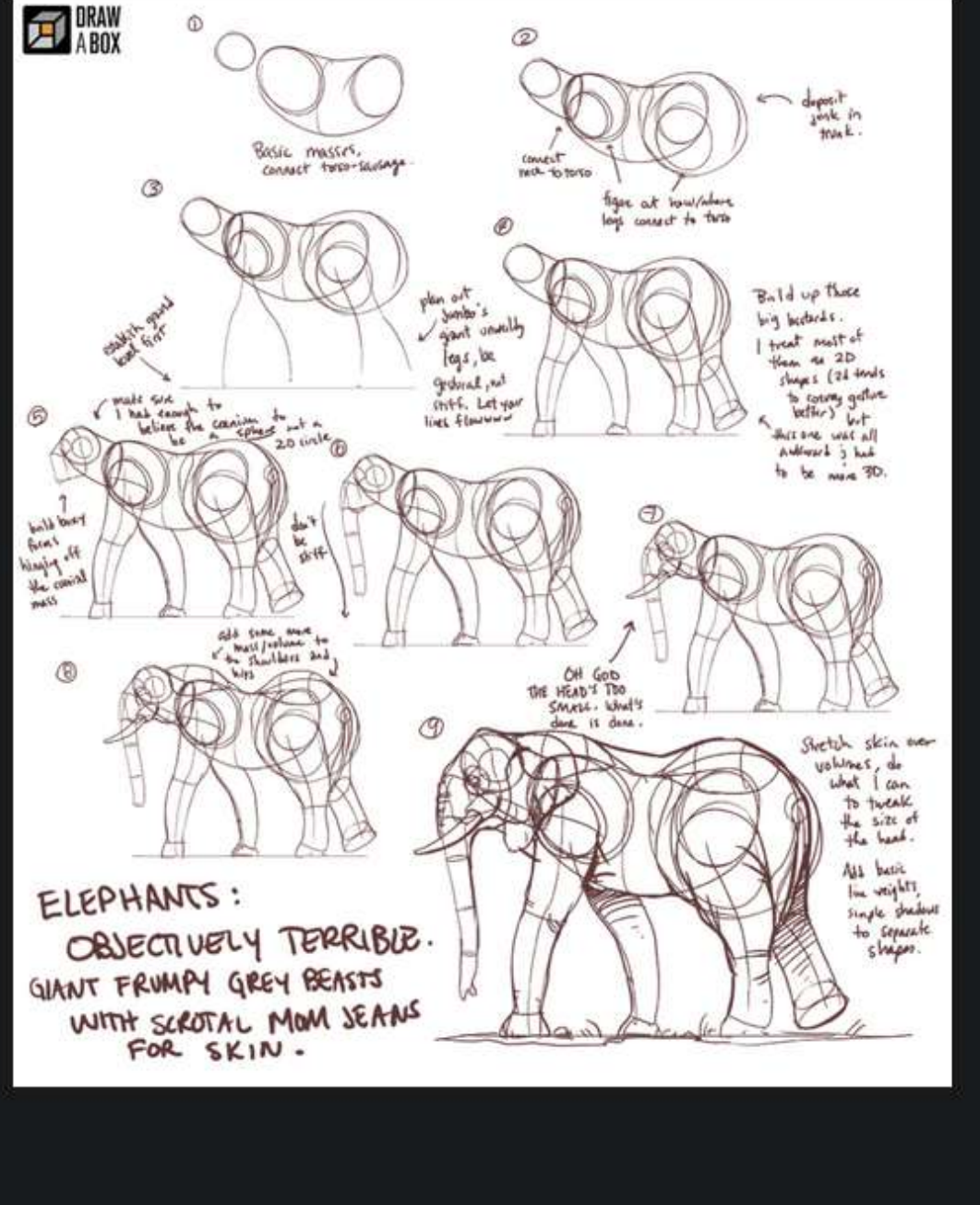
Applying fur to a raccoon

Taking the concepts described in the demo above, here I'm applying it to a construction of a raccoon.


THINK IN 3D!
Cleanup, details, minor fixes.
SAY HELLO TO MR. ORYX.
DRAW A BOX

Oryx construction

Constructional principles applied to an oryx. Notice how I'm building up the bulk of its back with additional forms, not trying to achieve this all with the torso-sausage.

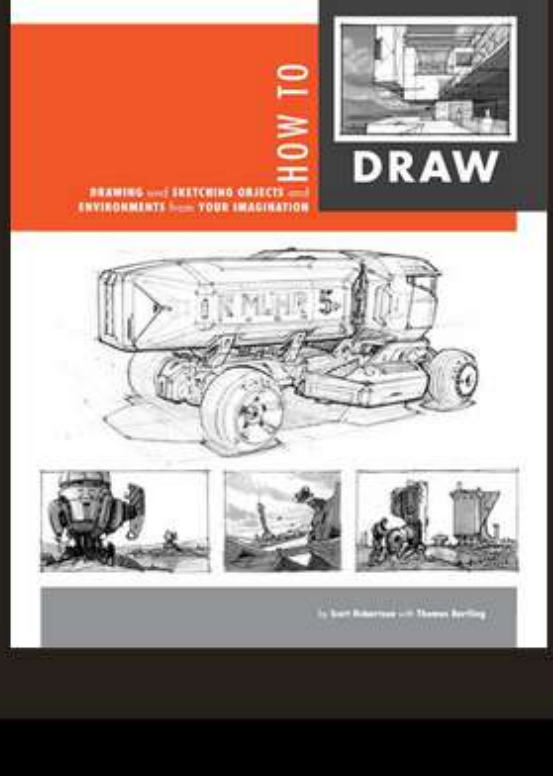

DRAW A BOX
Basic masses, connect torso-sausage
ELEPHANTS: OBJECTIVELY TERRIBLE. GIANT FRUMPY GREY BEASTS WITH SCROTAL MOM JEANS FOR SKIN.

Elephant construction

A construction of an elephant. Again, I'm not adhering to the sausage technique for the legs here, though they're still reflecting a lot of the gestural qualities that the technique espouses. Remember that these techniques you're learning are intended to teach you the concepts that lay beneath them. Once you get the hang of them - which can take some time and practice - you can then apply them as much or as little as you want.

Just be sure to stick to them when working through these lessons so I can be sure that you're getting a good deal of experience with them.

<<< White Pelican Demo
250 Cylinder Challenge >>>

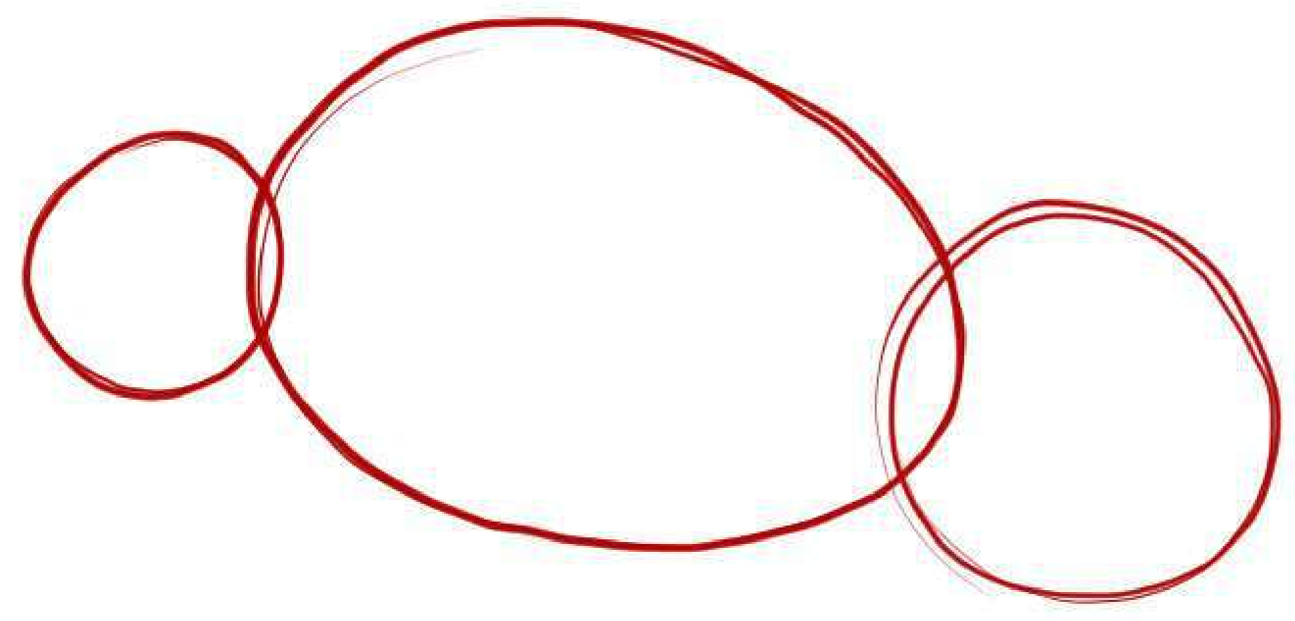


How to Draw by Scott Robertson

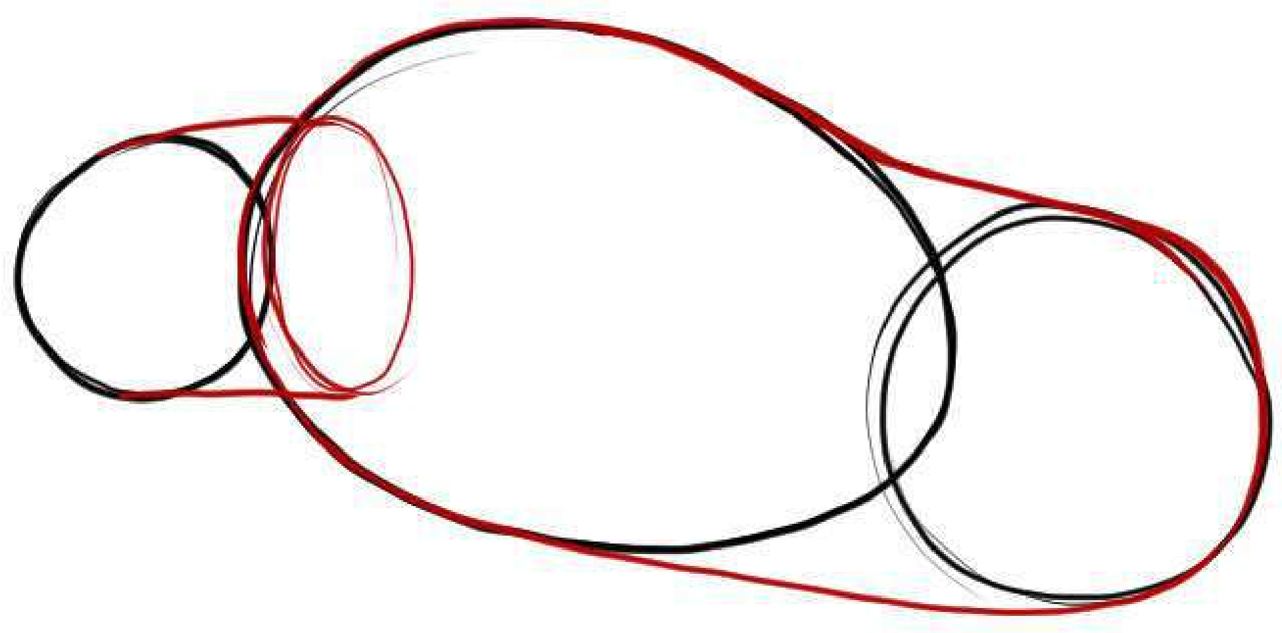
When it comes to technical drawing, there's no one better than Scott Robertson. I regularly use this book as a reference when eyeballing my perspective just won't cut it anymore. Need to figure out exactly how to rotate an object in 3D space? How to project a shape in perspective? Look no further.

But what about fish?

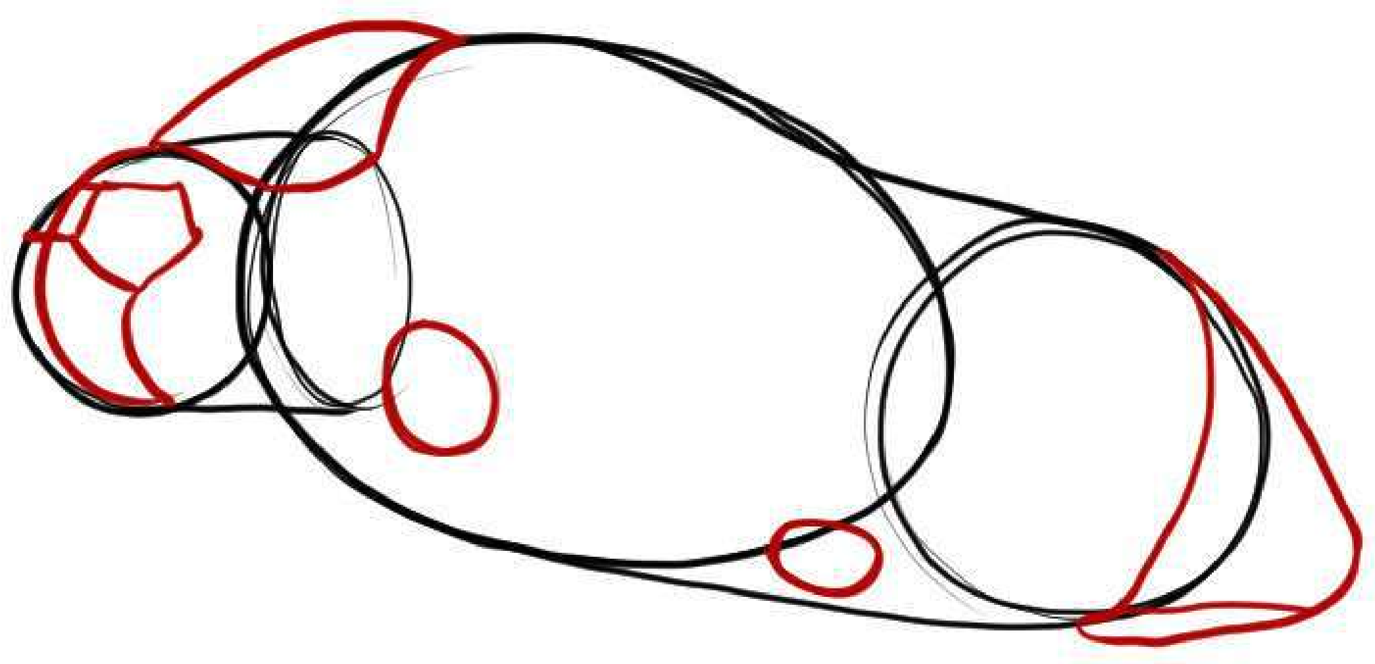
Applying construction to "non standard" animals.



1) start with simple forms for the major masses



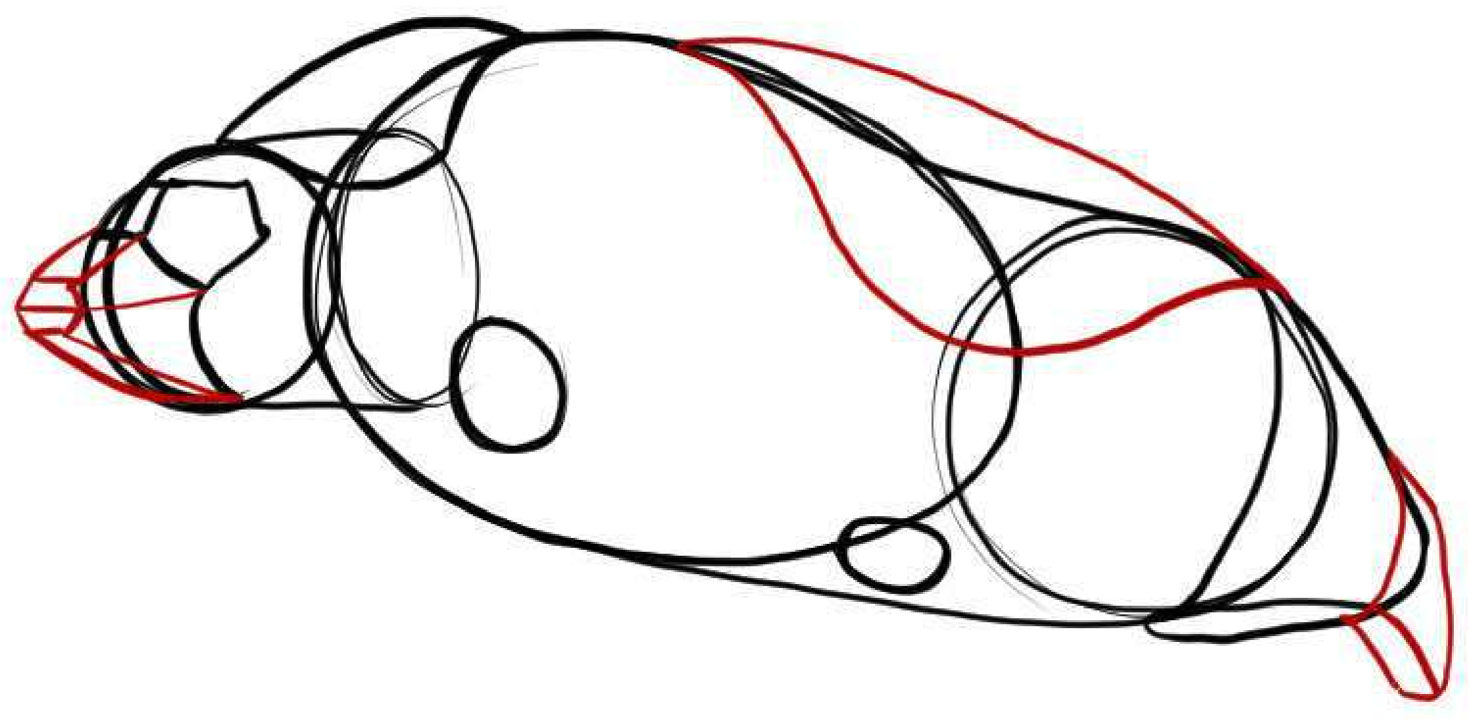
2) I've encapsulated the rib cage and Pelvis masses with a sausage form and connected the cranial ball to the body with a cylindrical neck.



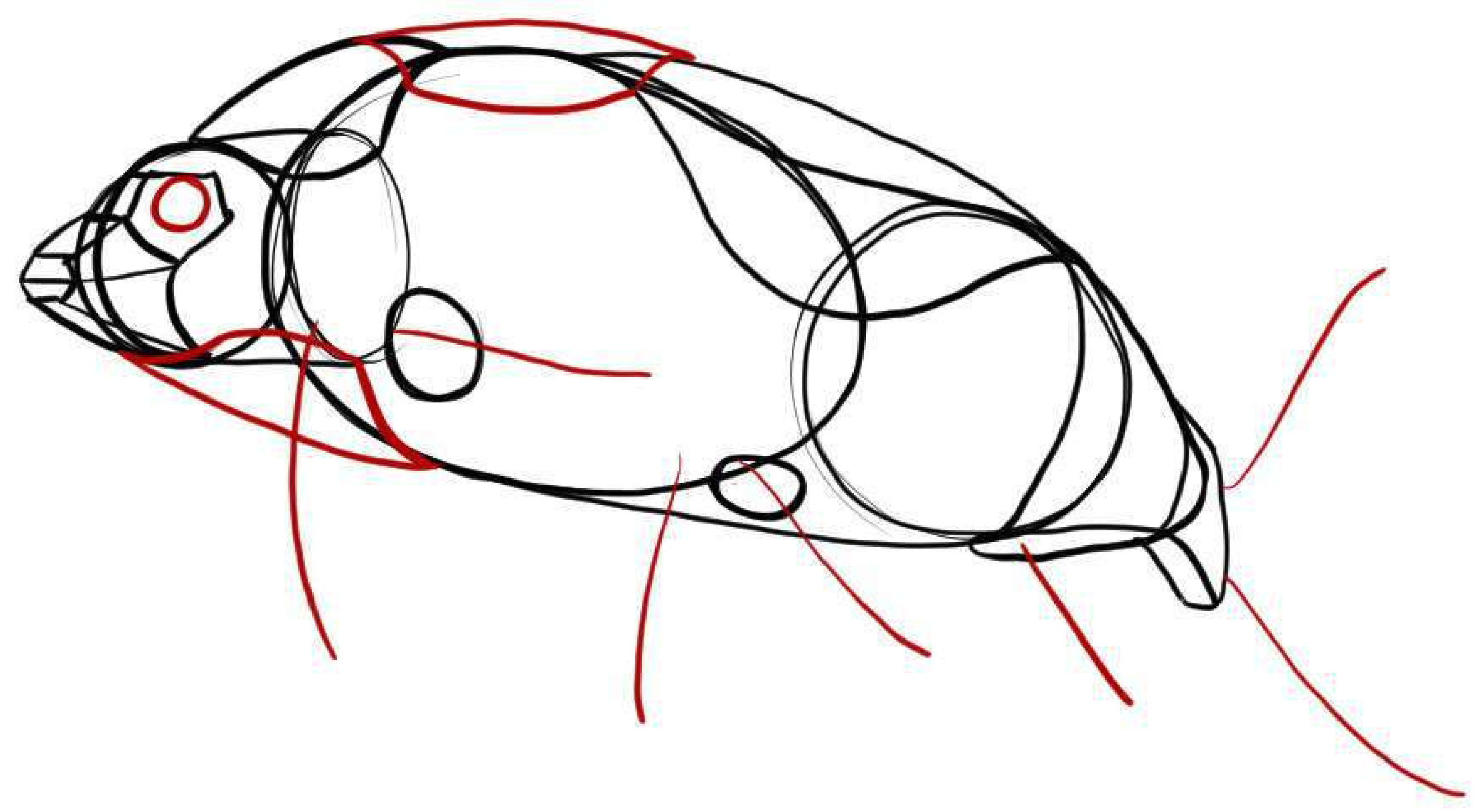
3) Eye sockets and footprint for the muzzle.

Establishing ellipses where the limbs (fins) will attach to the body.

Starting to build the tail - keeping each piece simple.



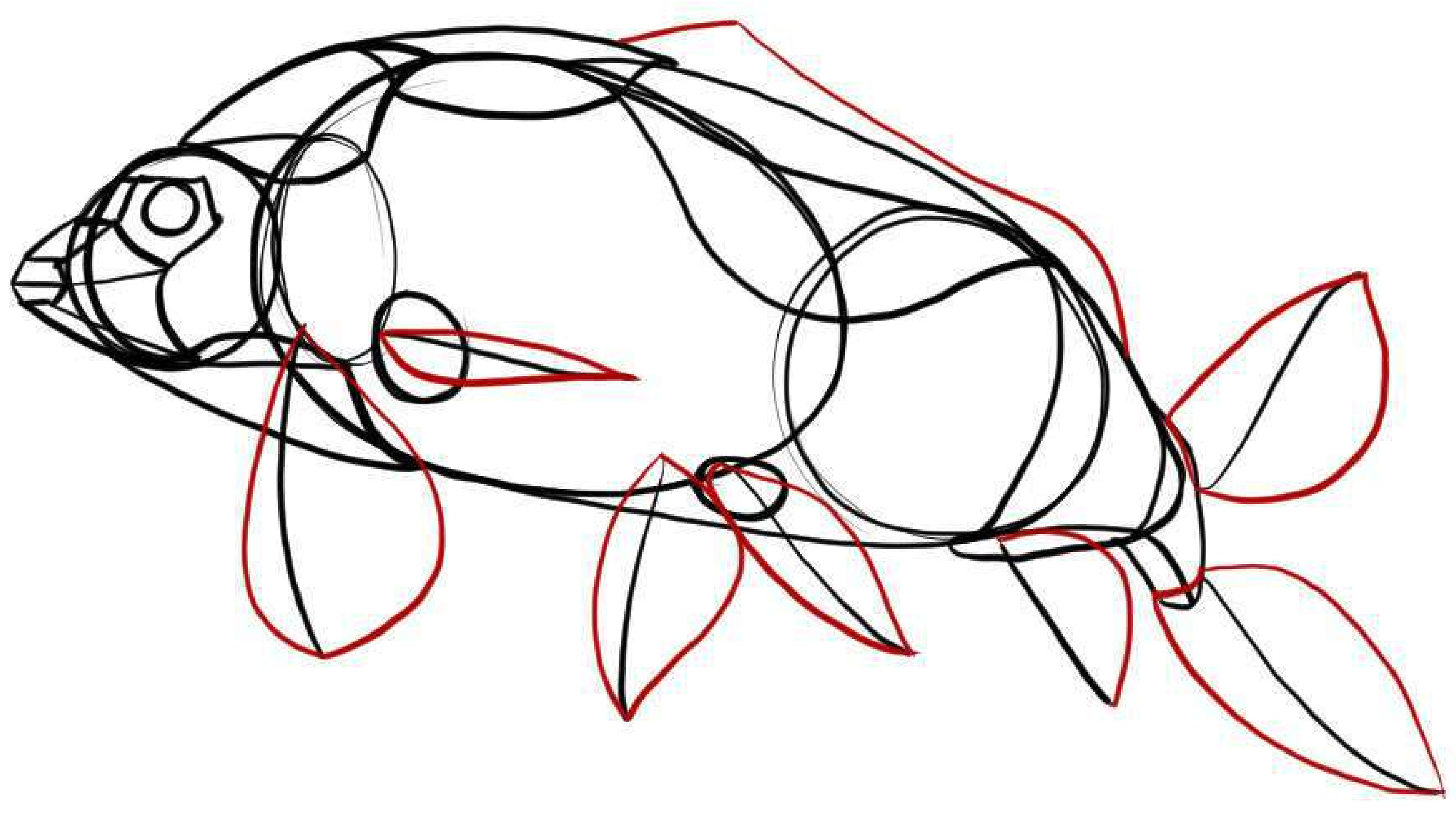
4) Extruding a boxy muzzle form.
starting to use additional masses to flesh out the body.
Adding another piece to the tail.



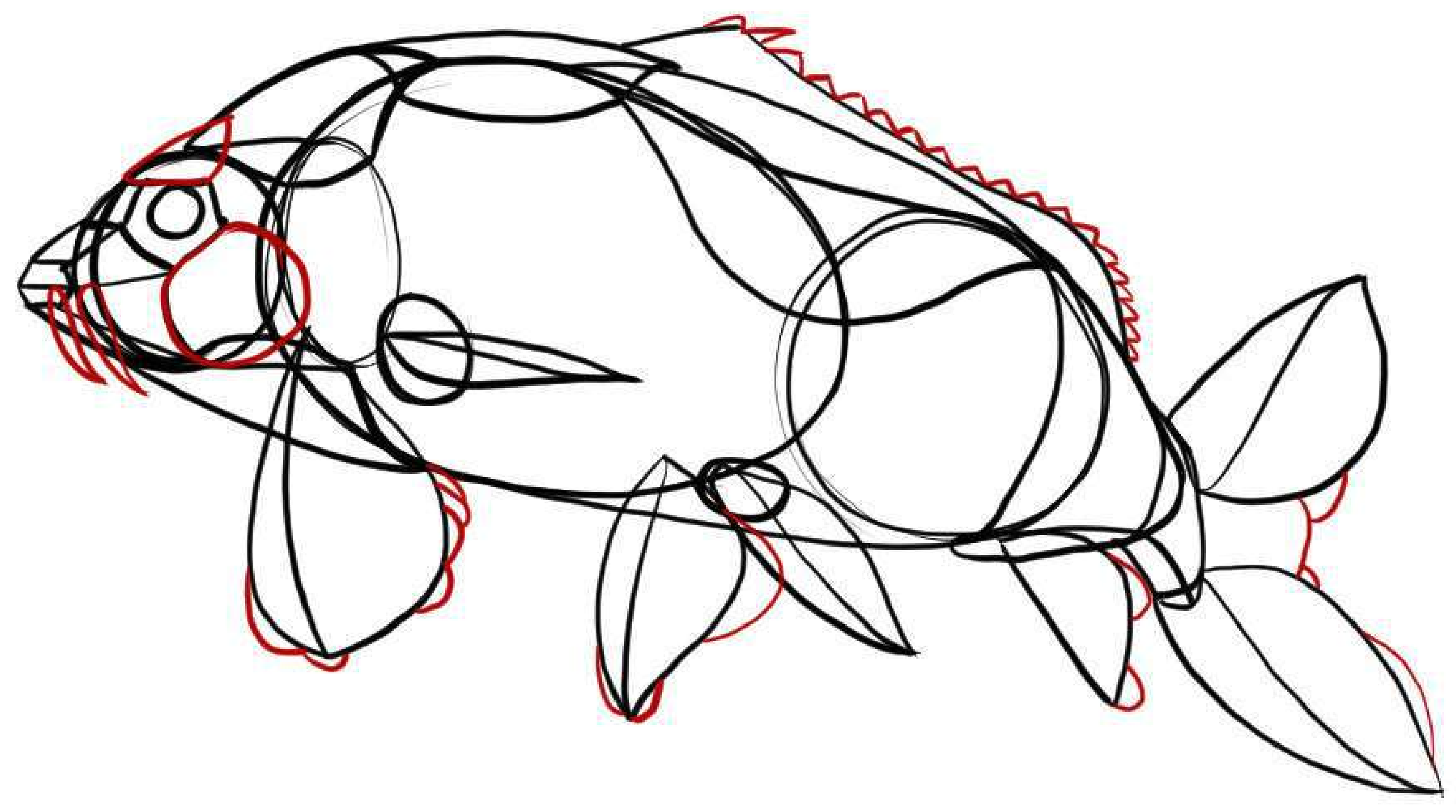
5) Added the eye ball.

The fins are paper thin, so I'll be using the "leaf exercise" to construct them.

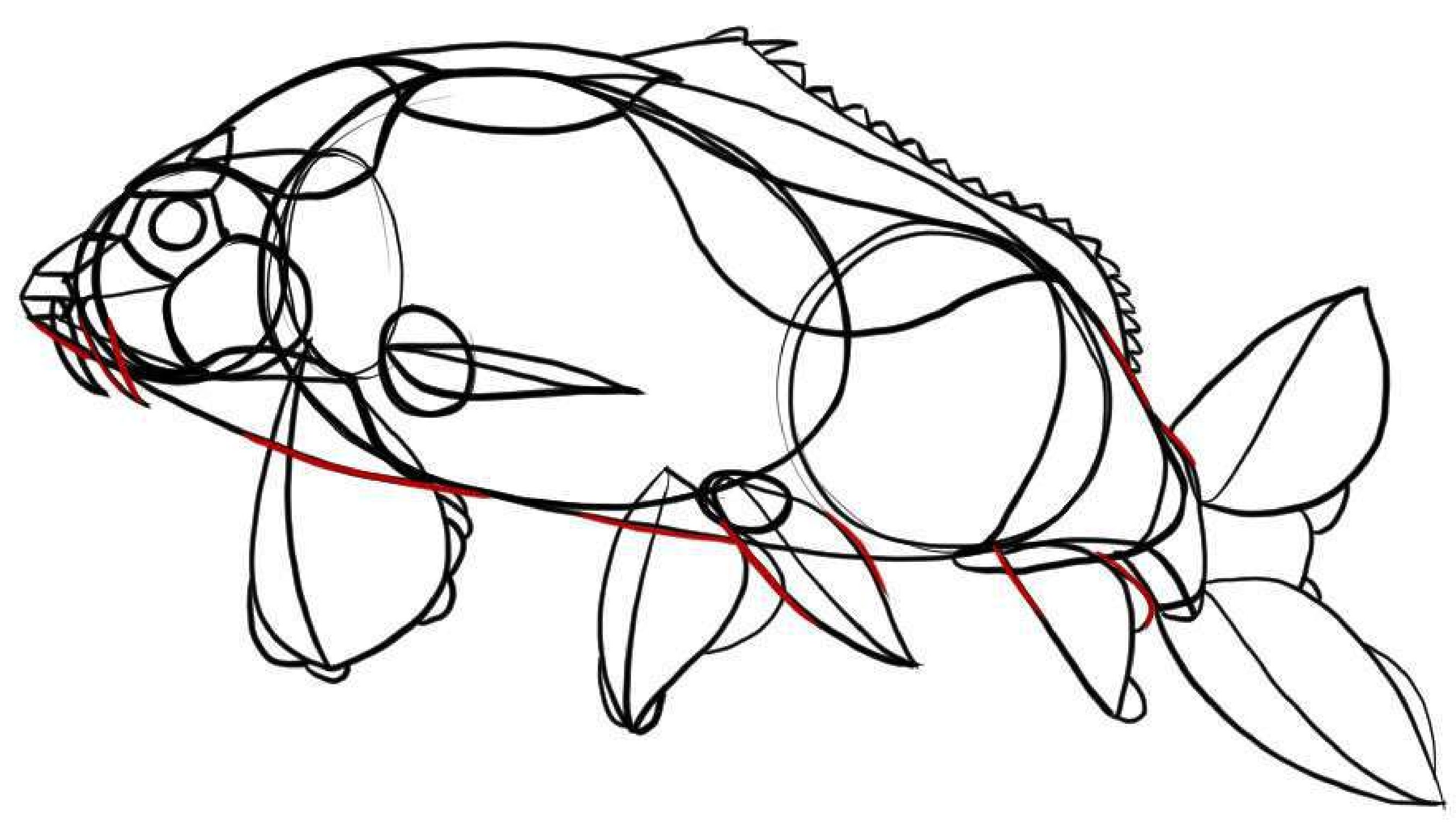
Here are the central flow lines.



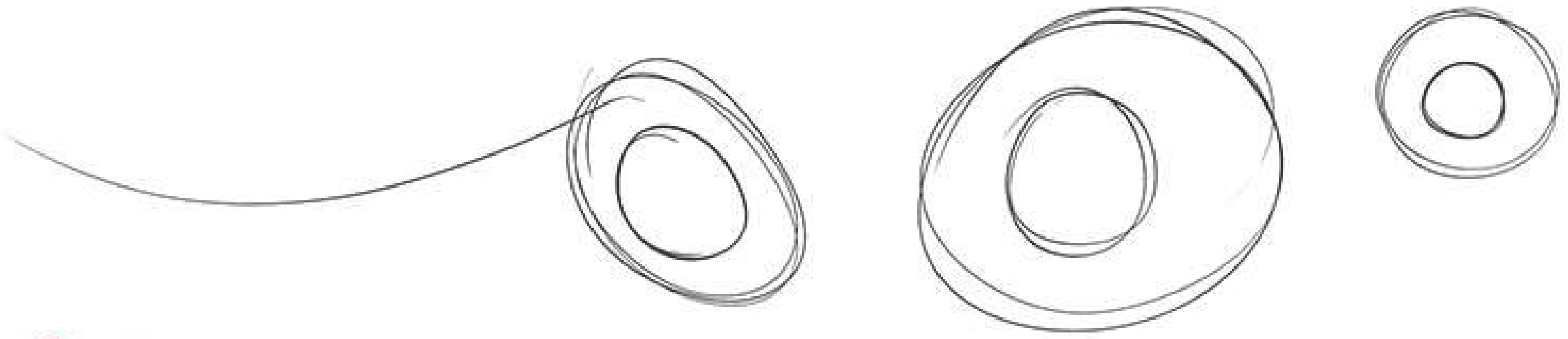
6) Connecting the sides of the fins.
I'm not trying to capture all the detail all at once.



7) Adding edge detail to the fins and some more pieces to the head construction.

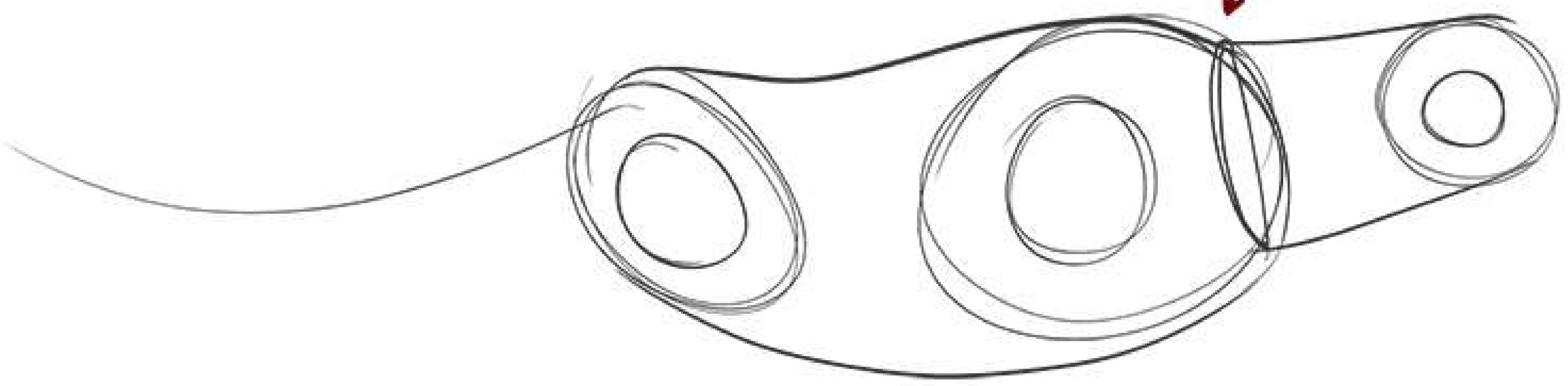


8) A little bit of extra line weight.
Applied to localised areas to clarify overlaps.



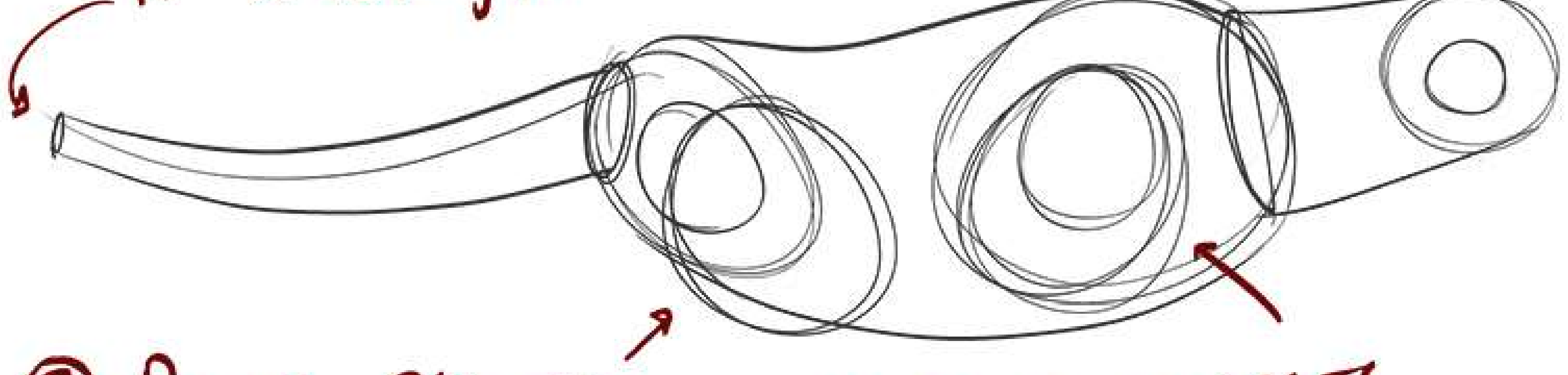
① LAY OUT MAJOR MASSES .

define connection

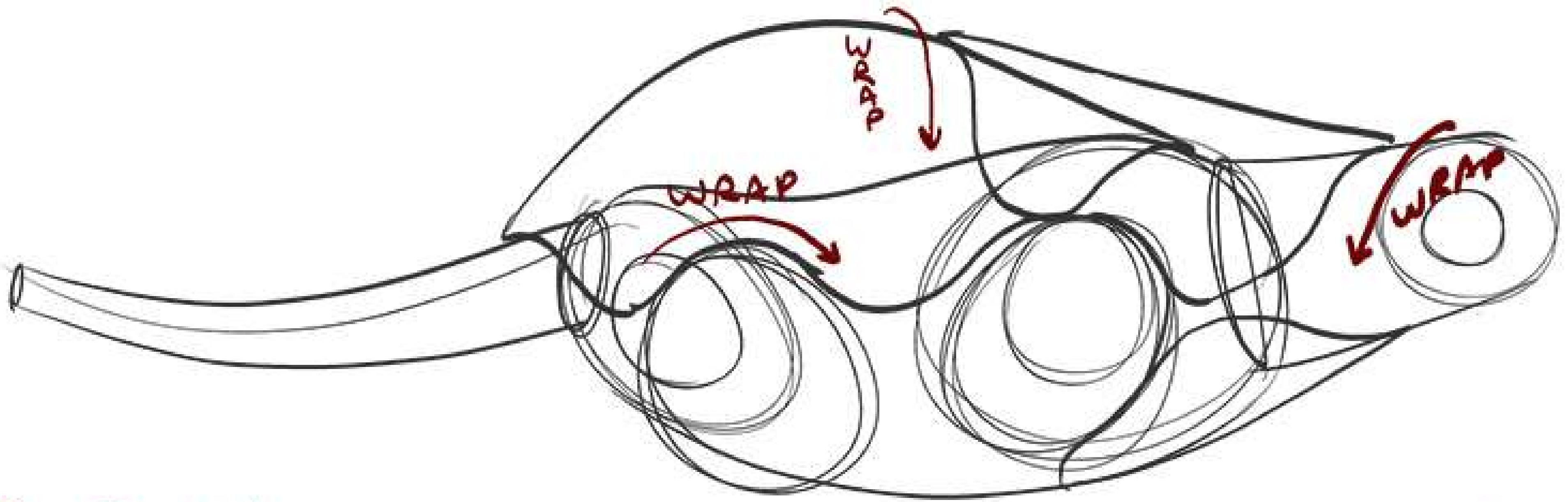


② BUILD TORSO SAUSAGE AND CONNECT TO CRANIAL BALL WITH NECK

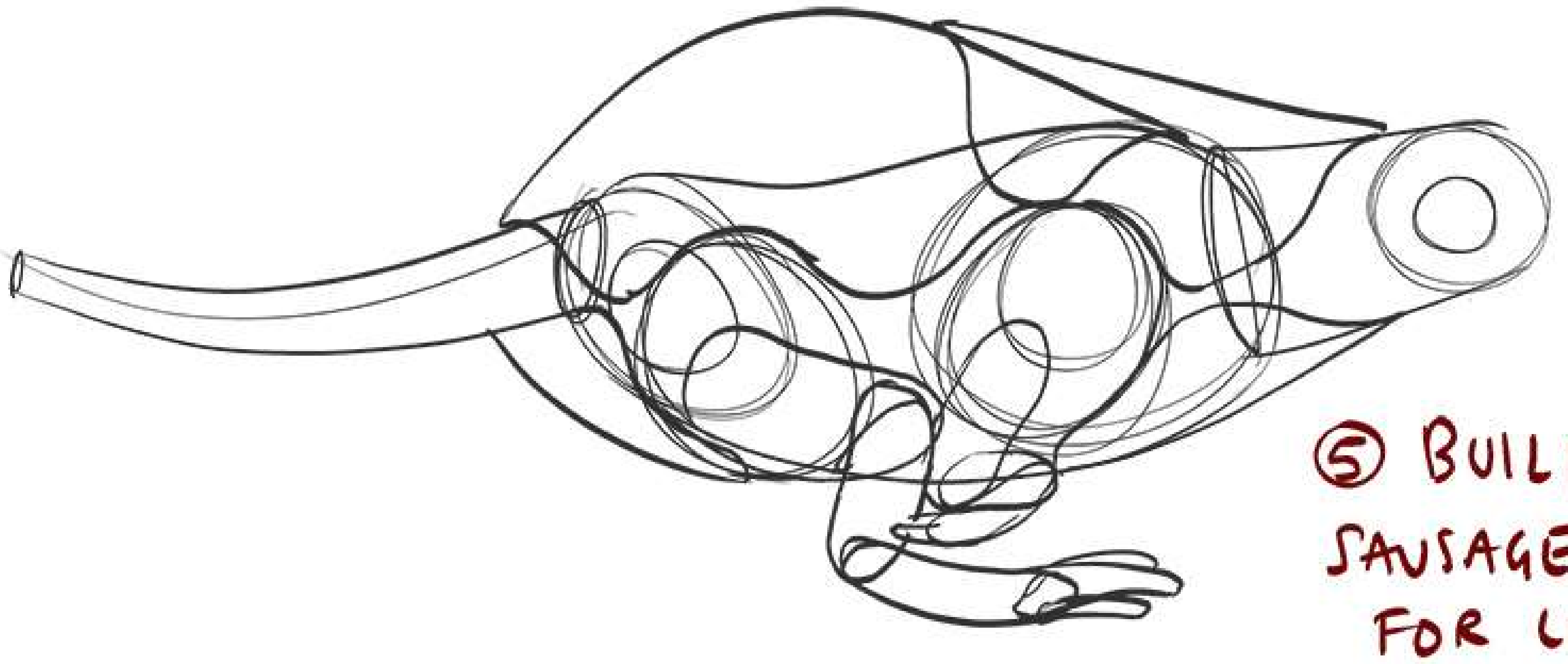
if a form gets cut off, cap it off



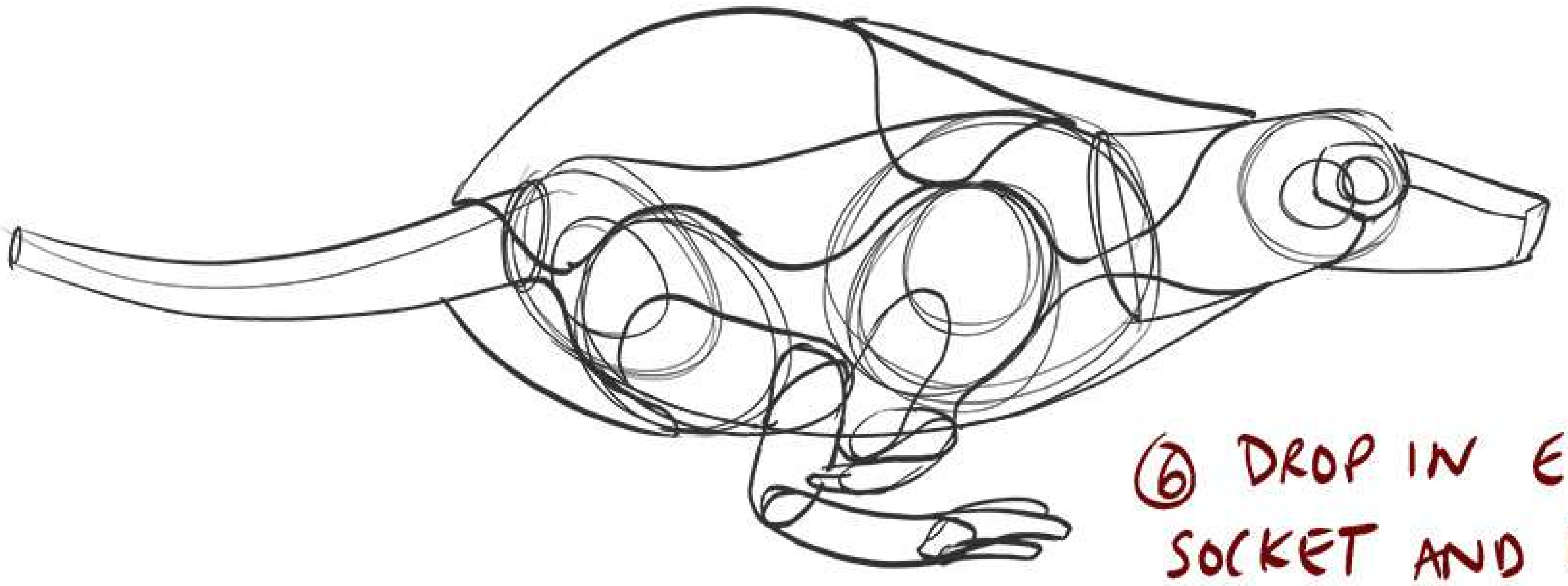
③ PLACE BIG THIGH MUSCLE MASSES



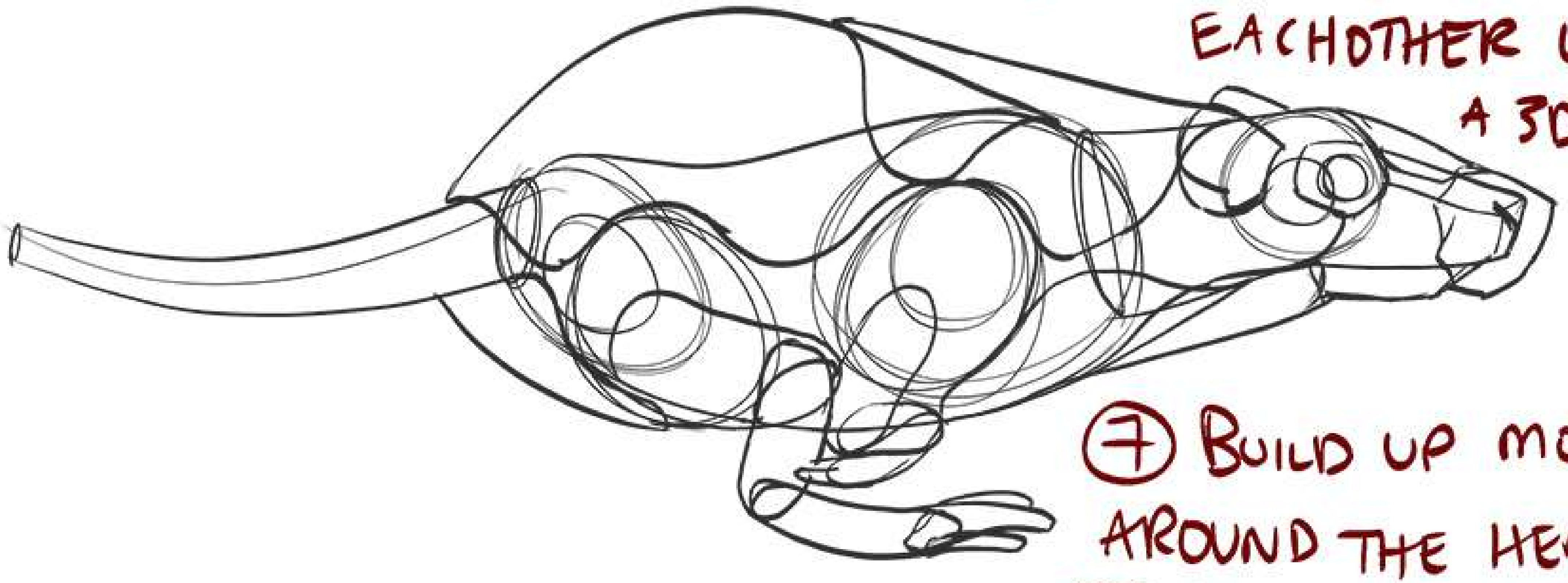
④ Build up additional forms around torso, wrapping around existing structures



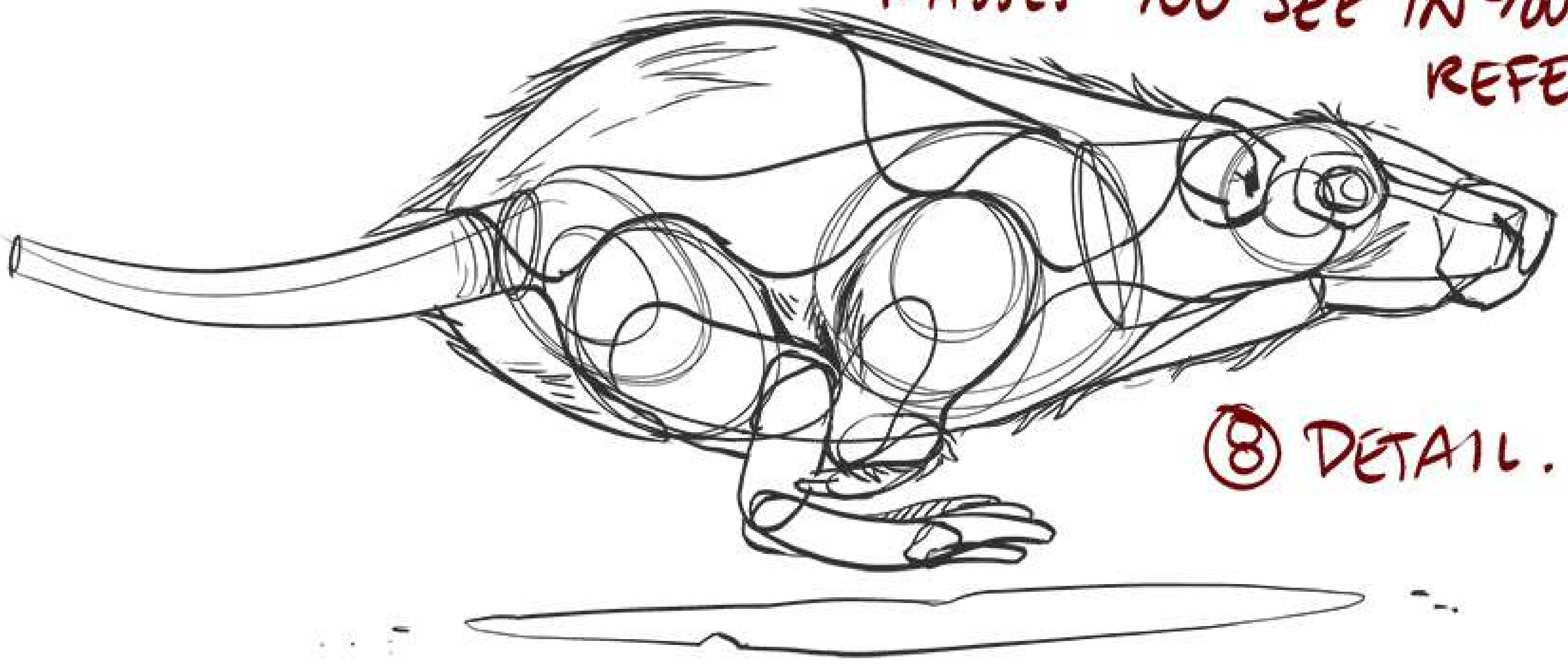
⑤ BUILD OUT SAUSAGE CHAINS FOR LEGS



⑥ DROP IN EYE SOCKET AND MUZZLE, BUTTRESSING THEM AGAINST EACHOTHER LIKE A 3D PUZZLE



⑦ BUILD UP MORE FORMS AROUND THE HEAD AS NEEDED TO CAPTURE THE MASSES YOU SEE IN YOUR REFERENCE.

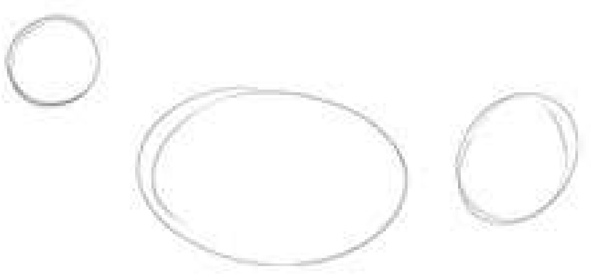


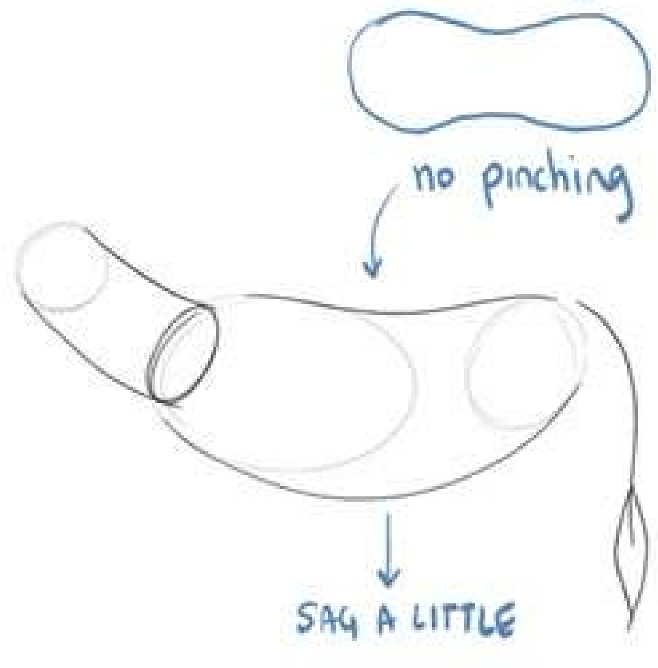
⑧ DETAIL . OPTIONAL

APPLYING CONSTRUCTION TO A DONKEY

https://drawabox.com/lesson/5

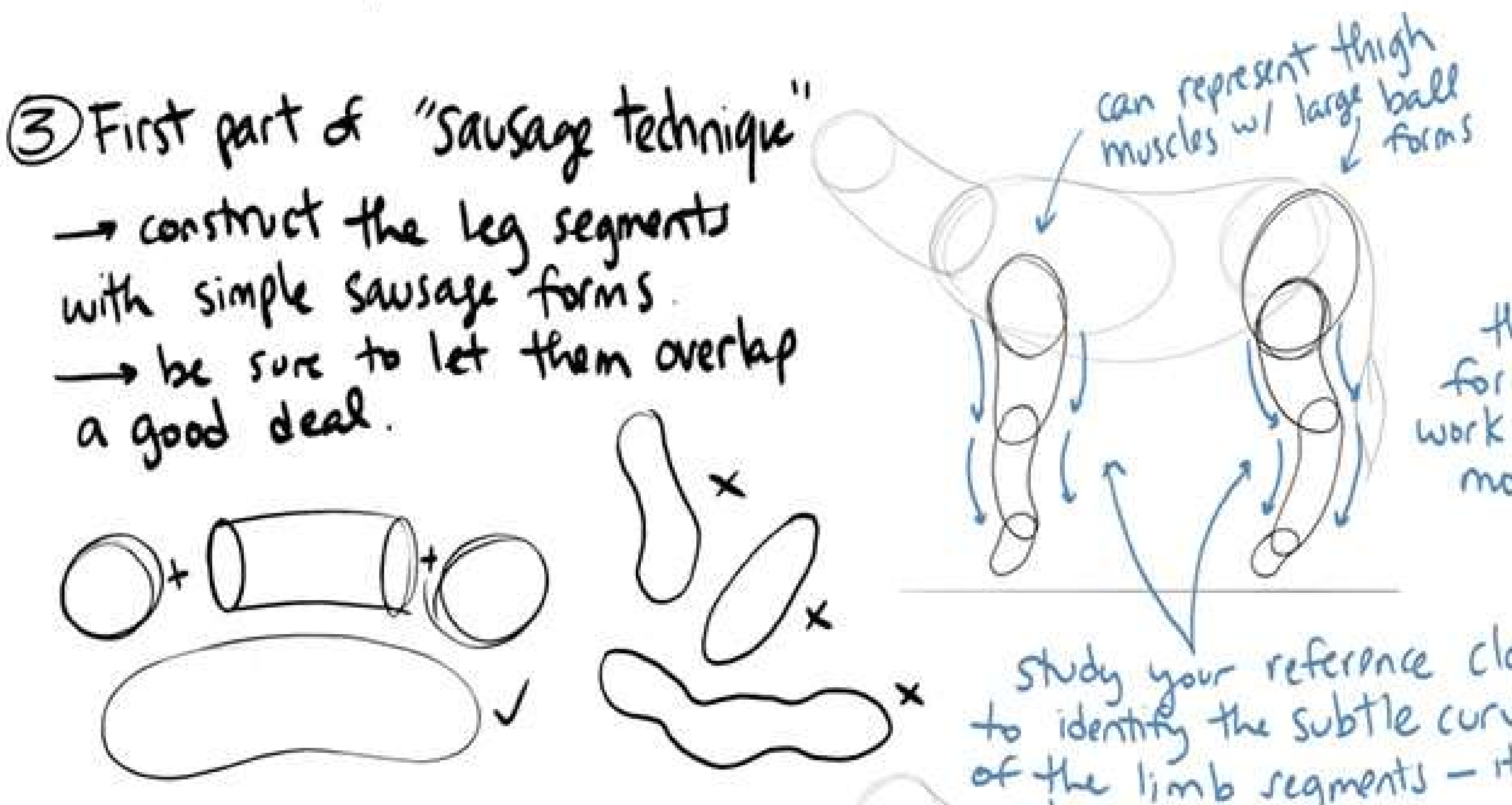
① We start with our basic masses:
Cranium (a sphere)
ribcage (½ the torso length)
pelvis (a slightly squished ball set at an angle, ¼ of the torso)

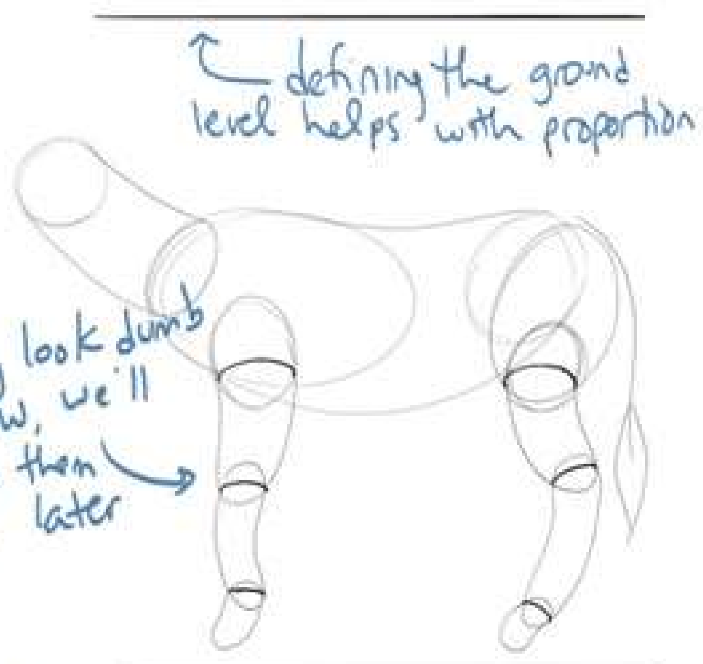




② Connect ribcage + pelvis into a sausage form. Sausages should generally be two equal spheres connected by a tube of consistent width, but here we're taking a little liberty.

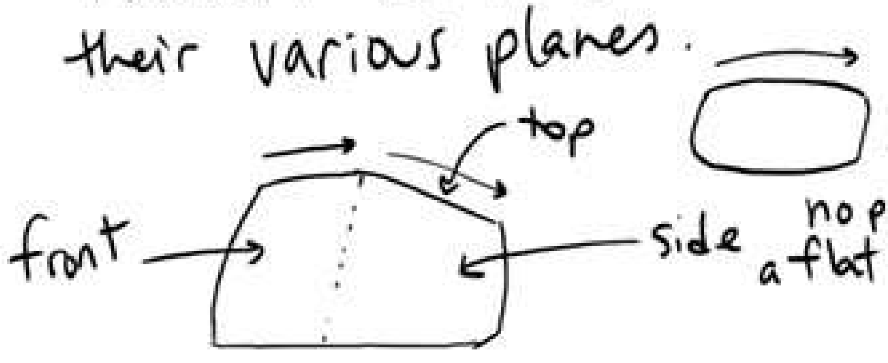
③ First part of "sausage technique"
→ construct the leg segments with simple sausage forms.
→ be sure to let them overlap a good deal.

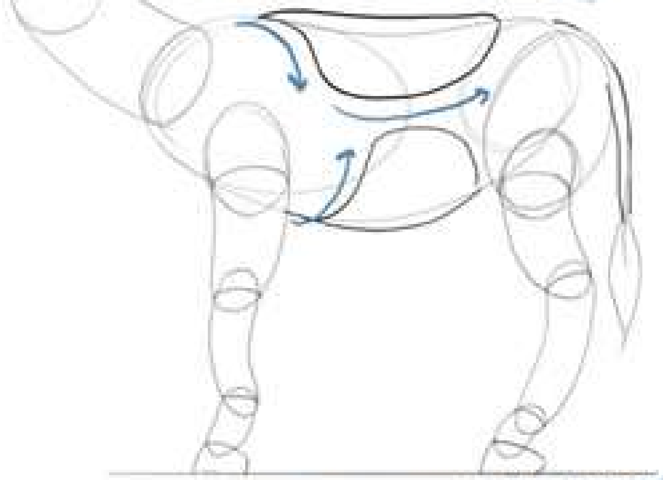

+
+
✓
x
x
x
can represent thigh muscles w/ large ball forms
study your reference closely to identify the subtle curvature of the limb segments — it's not always obvious.


defining the ground level helps with proportion
they look dumb for now, we'll work on them more later

④ Second part of sausage technique
→ reinforce the intersections of your sausage forms with a single contour line at each joint.
→ done correctly, this will make any further contour lines on the legs unnecessary (allowing us to avoid the resulting rigidity and maintain gesture/fluidity.

⑤ Just dropped in some hooves. Be mindful of their various planes.

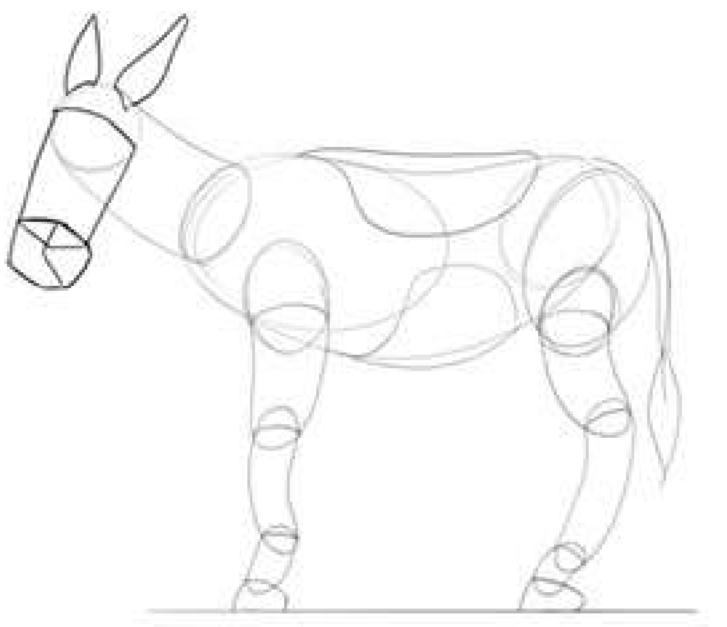


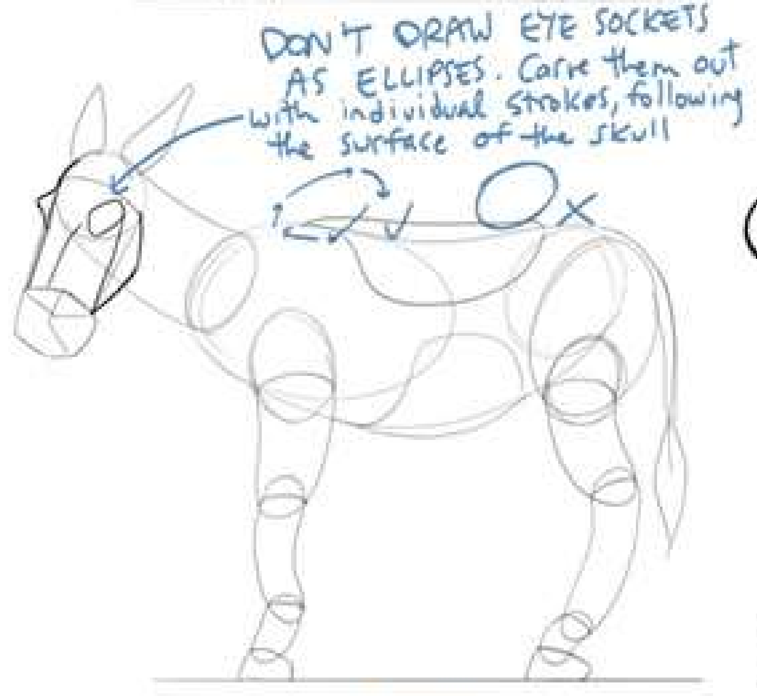


⑥ There are many places we will want to add masses to our construction to help build out our animal.

DO NOT ADD THESE AS 2D SHAPES. We have to be aware of how they wrap around the underlying construction as well as their own volume.

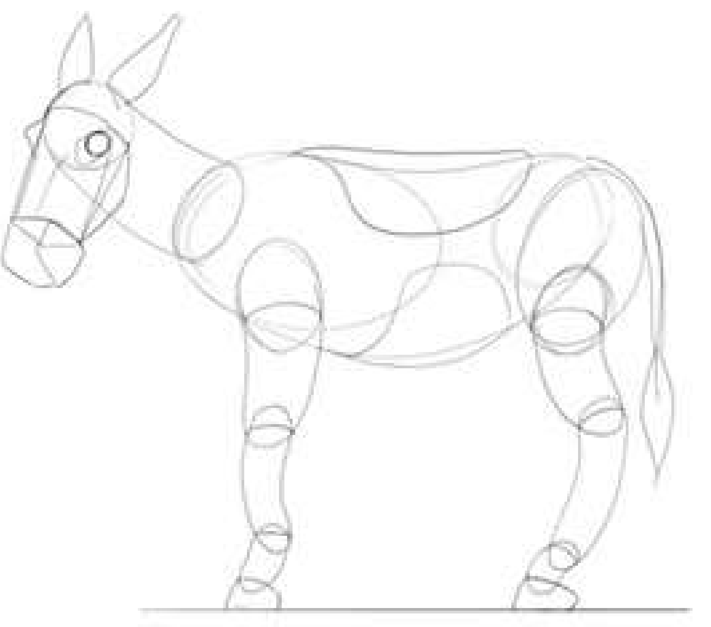
⑦ Starting to build out the head by appending boxy forms to the cranial ball.

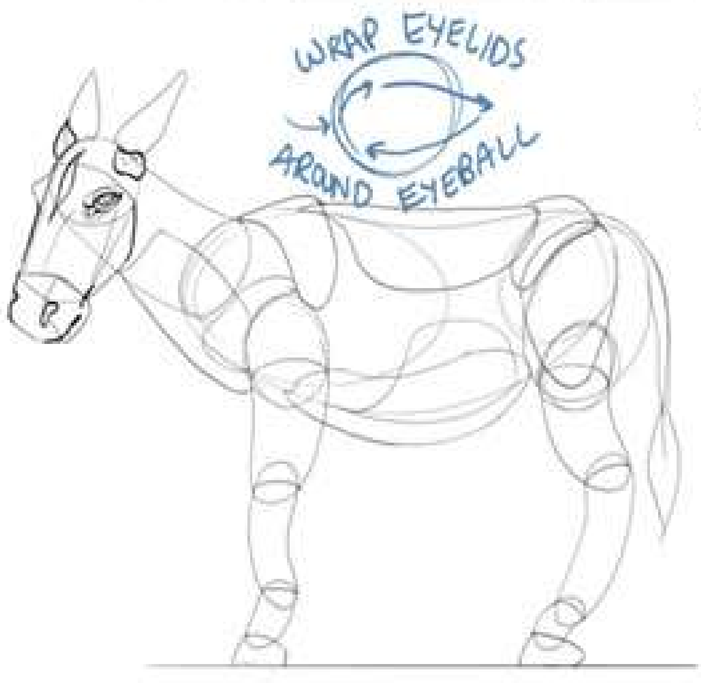



DON'T DRAW EYE SOCKETS AS ELLIPSES. Carve them out with individual strokes, following the surface of the skull
x

⑧ Continuing. Every addition must be drawn with an understanding of how it and the forms to which they connect occupy 3D space. NEVER think in terms of adding 2D shapes to a 2D drawing. Even if you're just adding a line or two these lines are part of 3D forms and move through 3D space. BELIEVE the illusion you're creating.

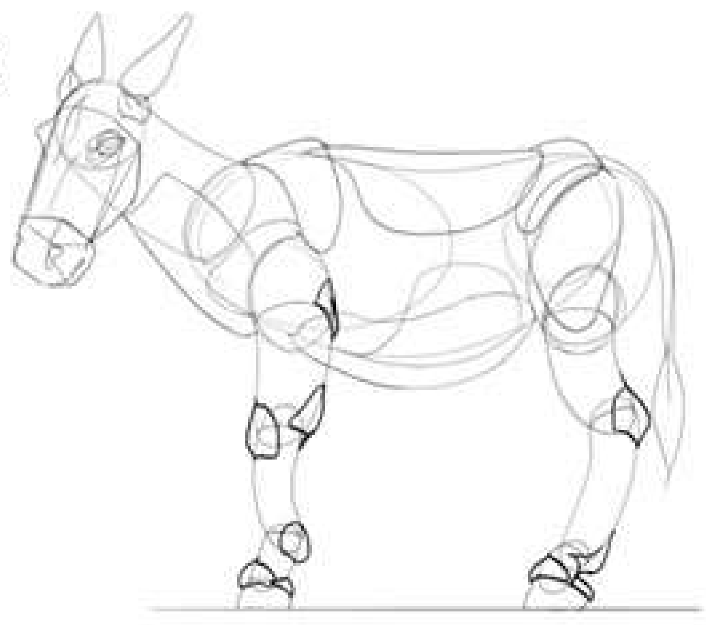
⑨ Pop an eyeball (a sphere) into the eye socket. Don't draw it too small. It will serve as the foundation of the eyelids.

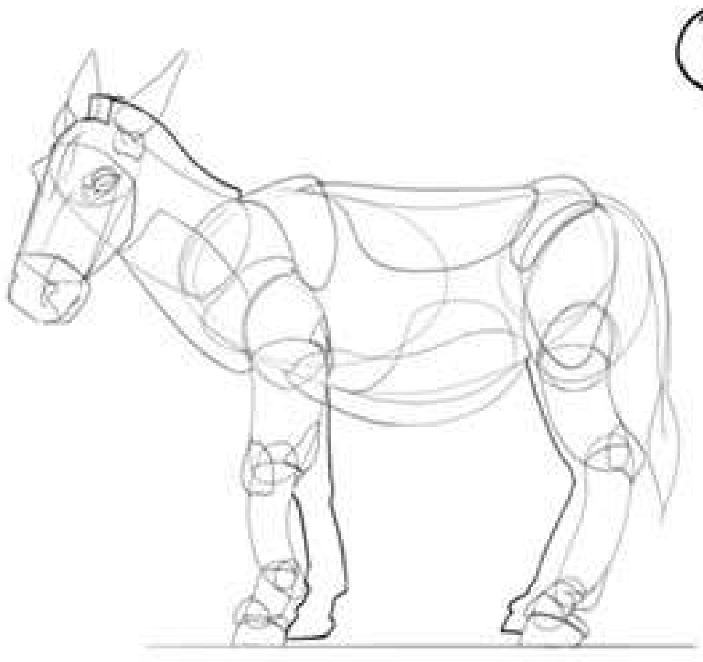




⑩ Continuing to develop the head. Adding masses, constructing eyelids, and so on.

⑪ Back to the legs, I'm adding masses to capture elements I see in my reference. Still careful to draw them with an awareness of the underlying forms.



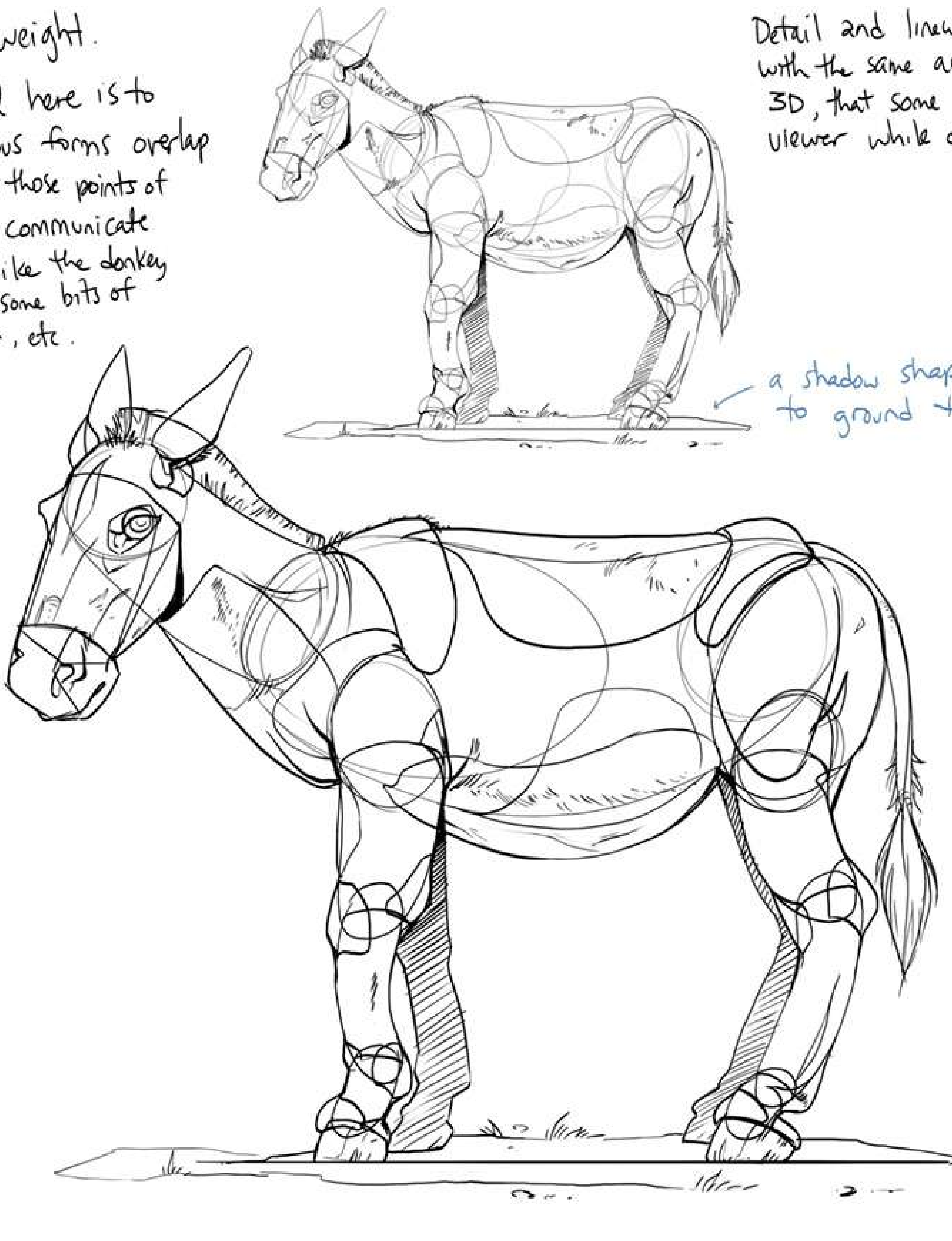


⑫ Instead of constructing the legs on the other side, I drew them as flat shapes/silhouettes to keep the drawing from getting too visually complex, and to push them back/pull the other legs forward.

⑬ Detail + line weight.

My main goal here is to clarify how various forms overlap (by adding weight at those points of overlap) and to communicate minor details — like the donkey has short hair, some bits of muscle definition, etc.

Detail and lineweight should still be added with the same awareness that these forms are 3D, that some surfaces point towards the viewer while others point away, etc.

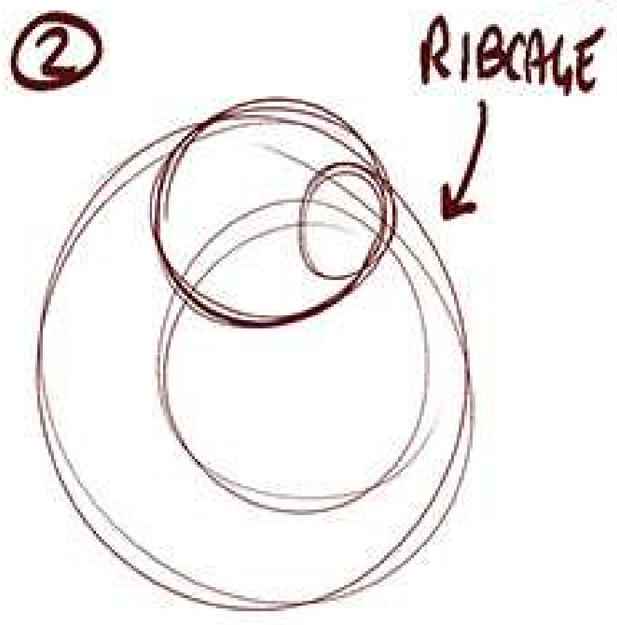

a shadow shape also helps to ground the object

LAYING IN THE BODY

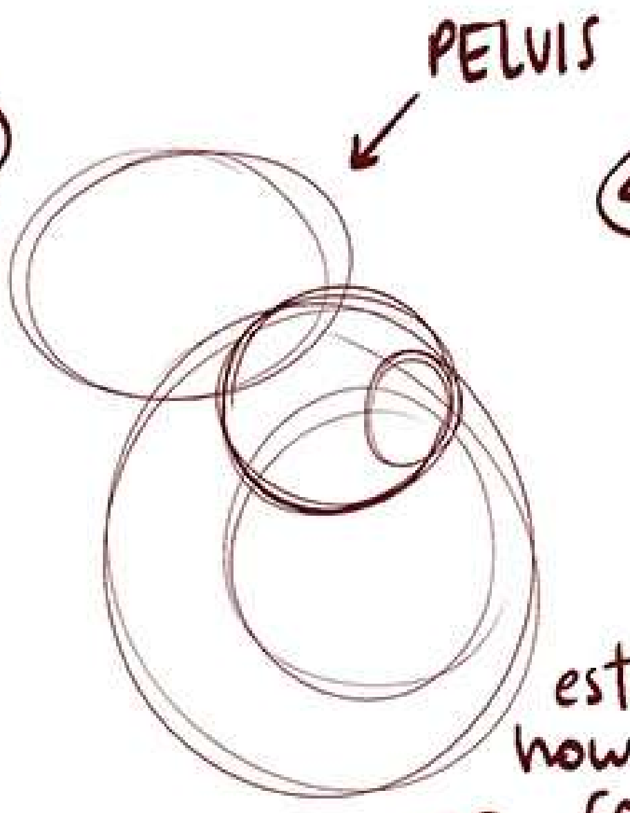
①

START WITH A CRANIAL BALL. REALLY YOU CAN START W/ ANY OF THE "MAJOR MASSES" (CRANIUM, RIBCAGE, PELVIS)

②

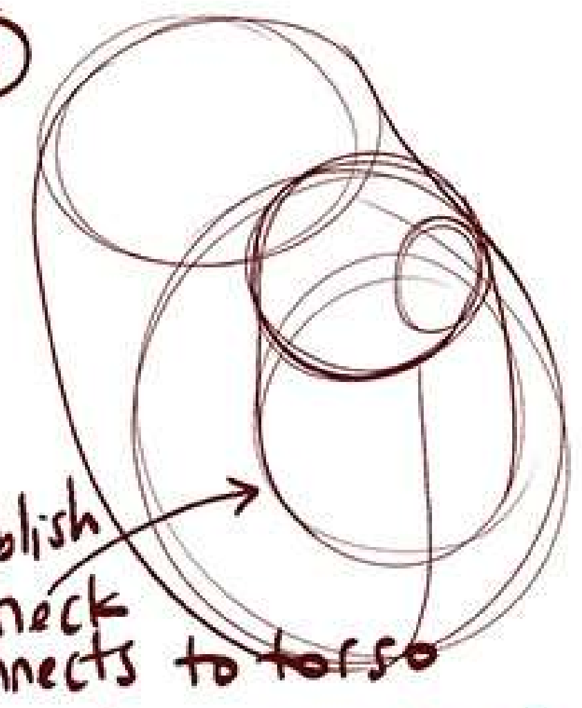


③



LAY IN THE OTHER MAJOR MASSES, PAYING ATTENTION TO THEIR RELATIONSHIPS IN YOUR REFERENCE.

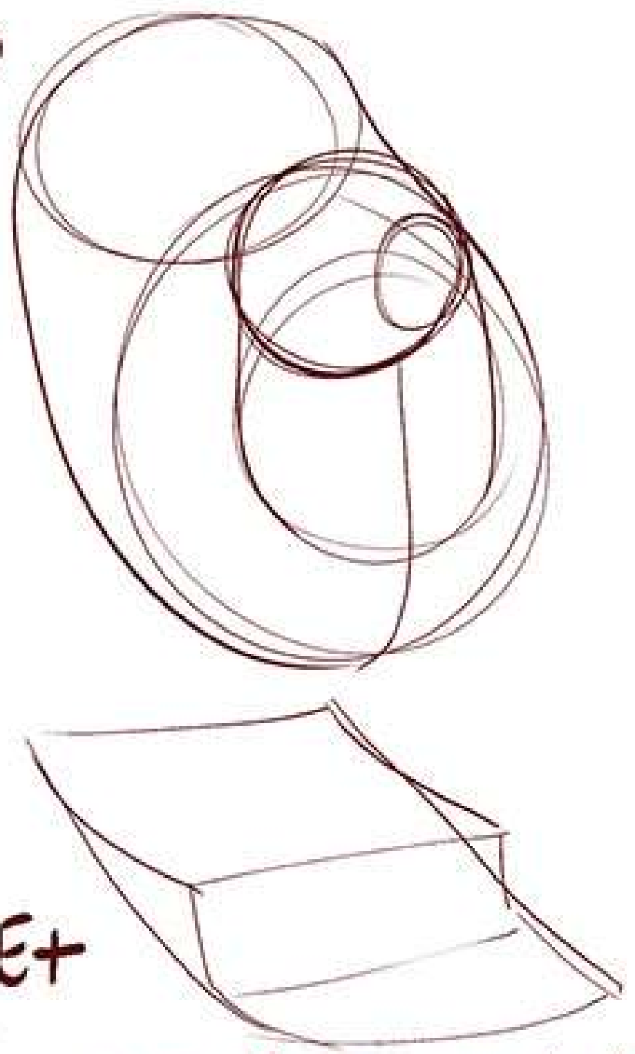
④



establish how neck connects to torso

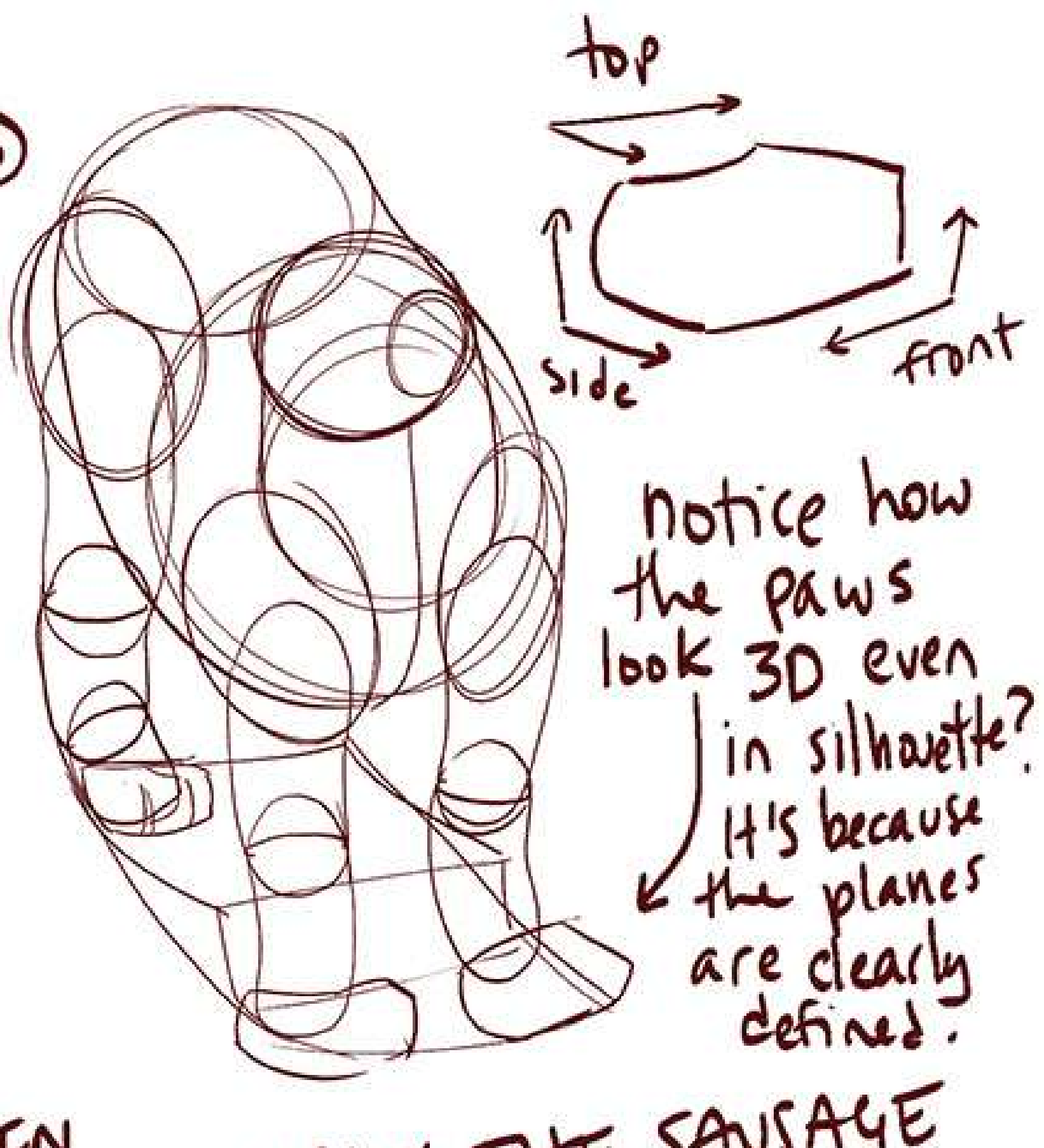
BUILD YOUR TORSO SAUSAGE (COMBINING RIBCAGE+PELVIS) & CONNECT CRANIUM TO TORSO

⑤



ESTABLISHING YOUR GROUND CAN HELP WHEN THE POSE IS COMPLICATED

⑥

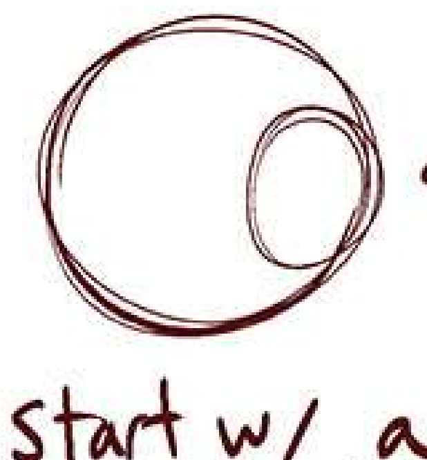


notice how the paws look 3D even in silhouette? It's because the planes are clearly defined.

USING THE SAUSAGE METHOD, BUILD YOUR LEGS.

CONSTRUCTING THE HEAD

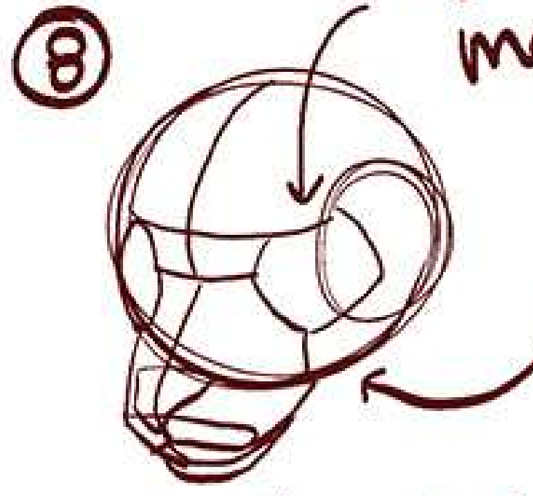
⑦



contour ellipse on one "pole" helps it read as 3D.

Start w/ a cranial ball.

⑧

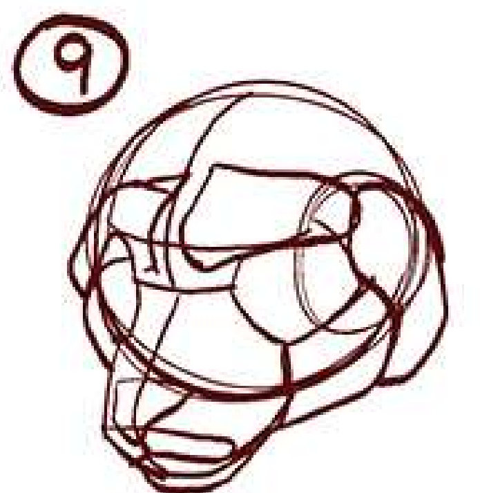


eye sockets are BIG and made of straight-ish lines.

eye socket, muzzle, cheekbone, brow ridge fit together like a puzzle

Carve in the eye sockets & attach the muzzle to the ball

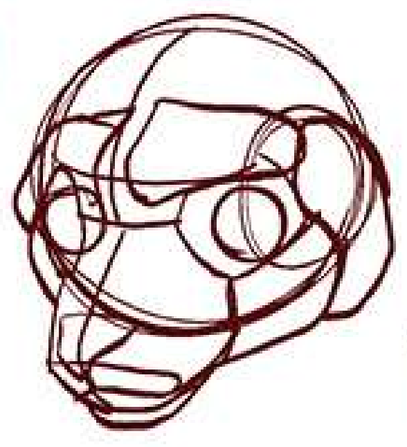
⑨



★ Remember you are adding 3D forms to a 3D structure. Consider their relationships in 3D space to one another.

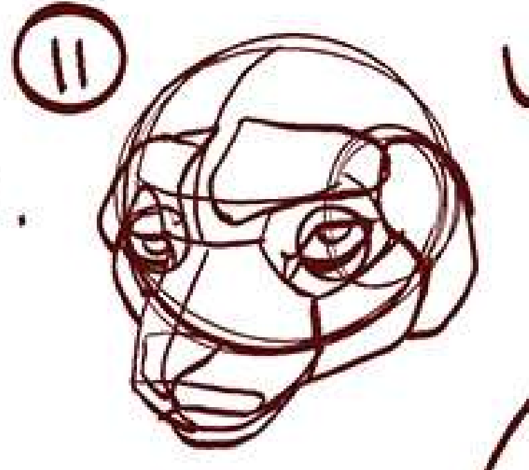
Bulk out additional needed forms. Do NOT DRAW 2D, FLAT SHAPES!

⑩

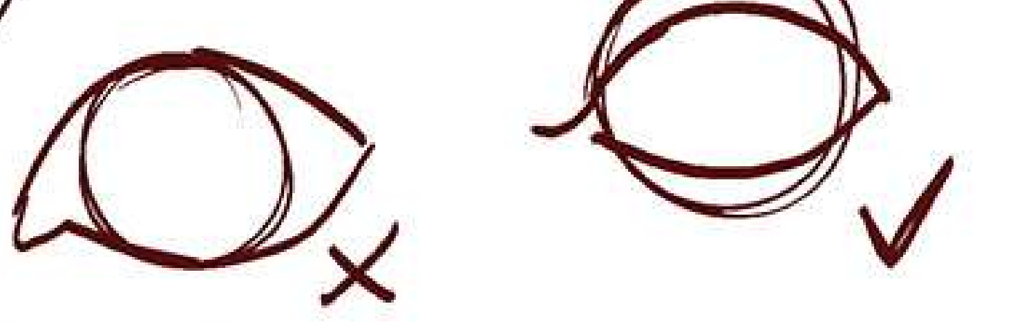


Place eyeballs into the sockets. Do NOT MAKE THEM SMALL.

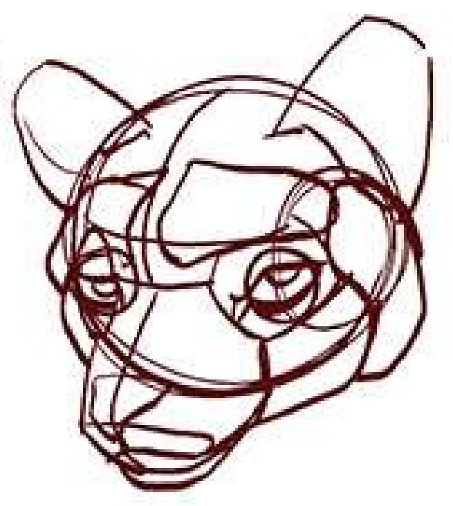
⑪



Wrap eyelids around eyeball.



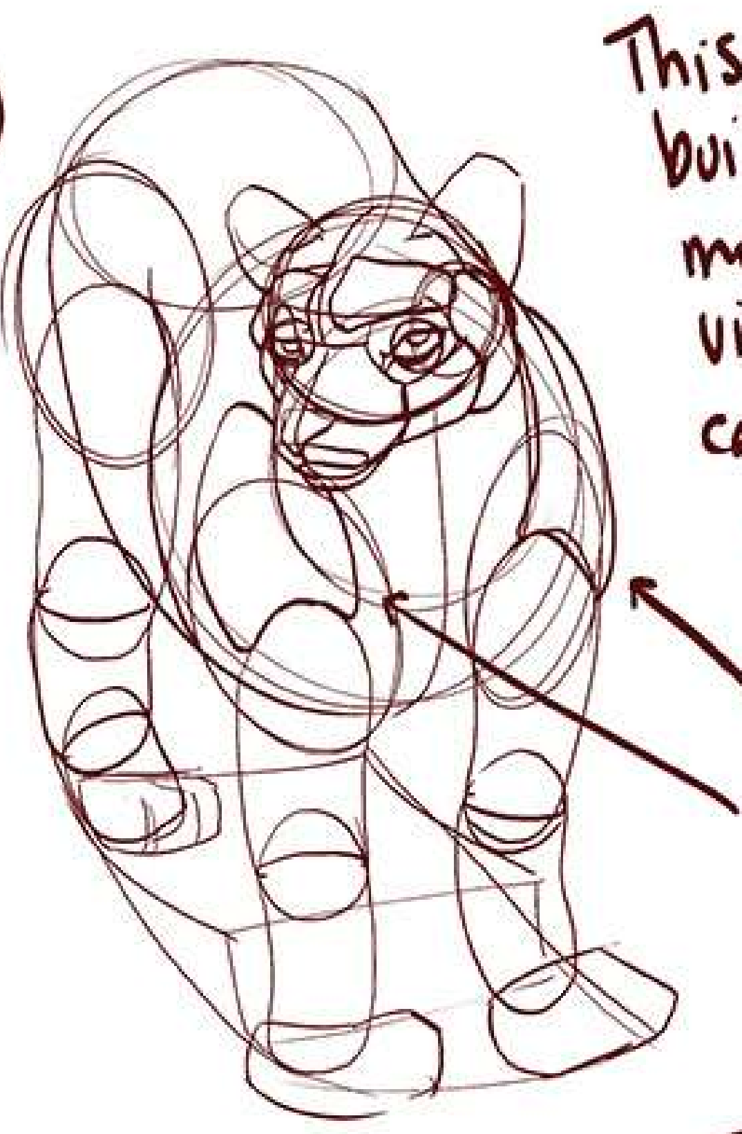
⑫



Add ears. Be aware of how they connect to the head structure in 3 dimensions.

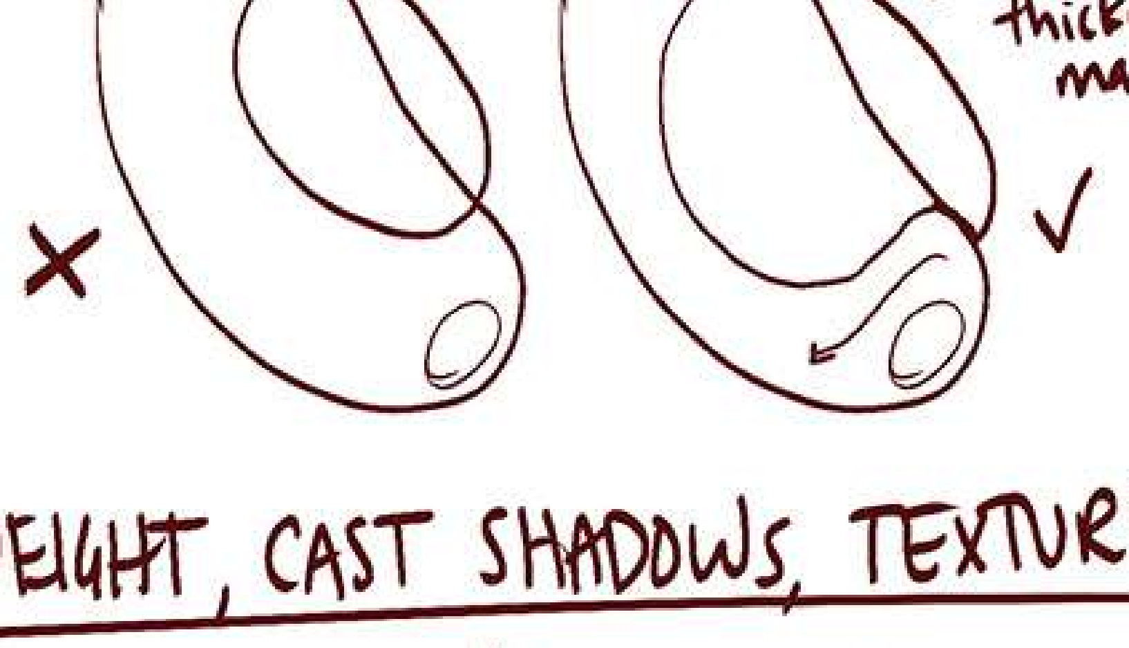
BUILDING UP MORE SPECIFIC FORMS

⑬



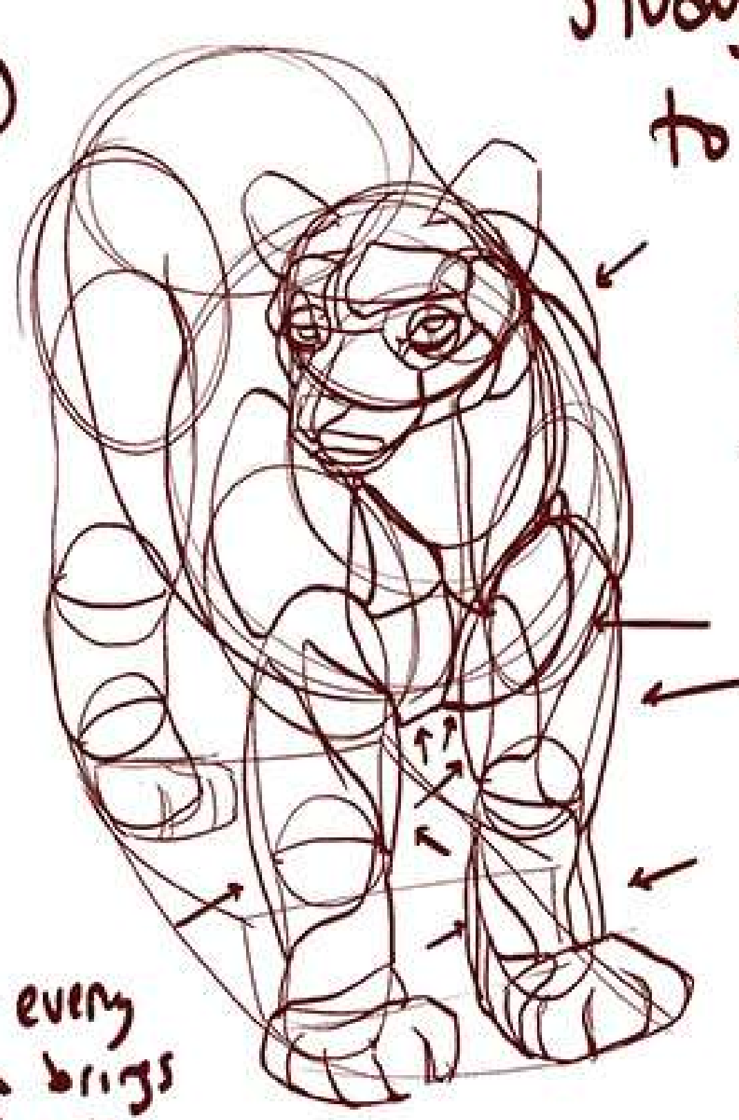
This is where we start building up some of the more nuanced, subtle visual information, usually caused by our animal's muscle groups.

focus on WRAPPING your additional forms around the existing structure.



remember every additional form brings its own thickness/mass.

⑭

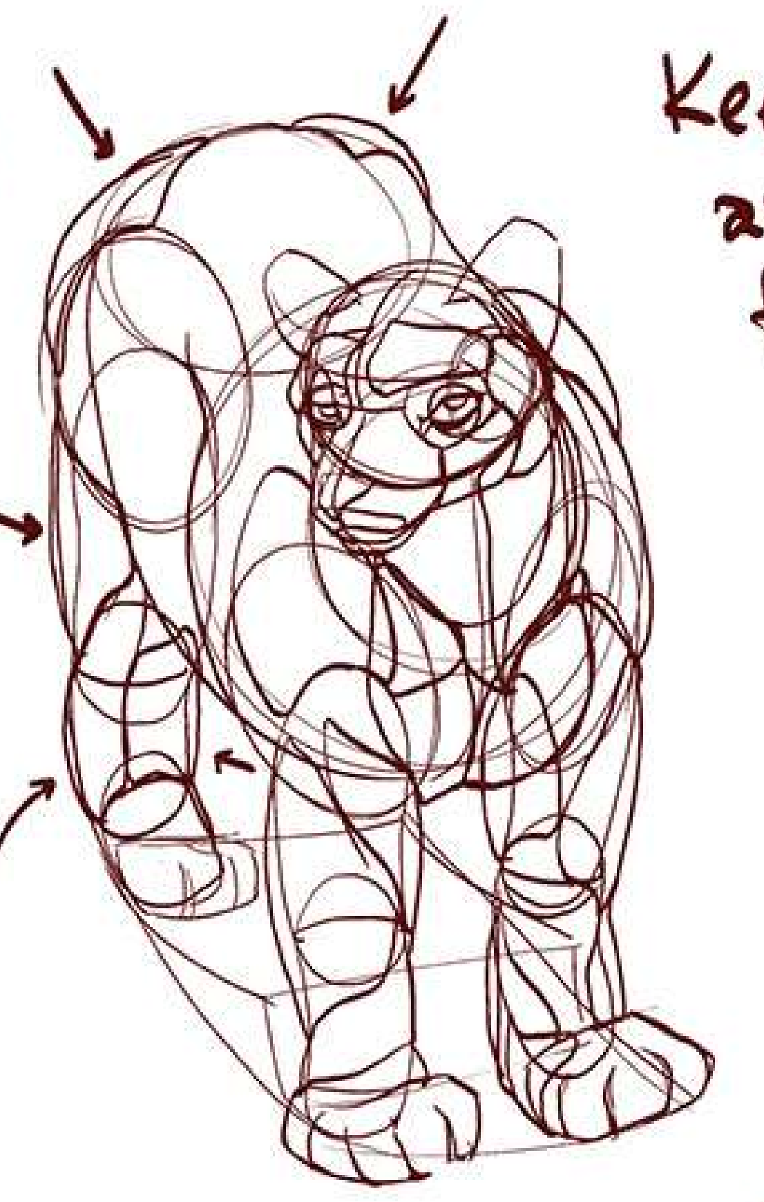


Study your reference carefully to identify where you can build up these additional masses.

There are lots of little places they can go.

Like the head you should think about how the pieces fit together as a 3D puzzle where possible.

⑮



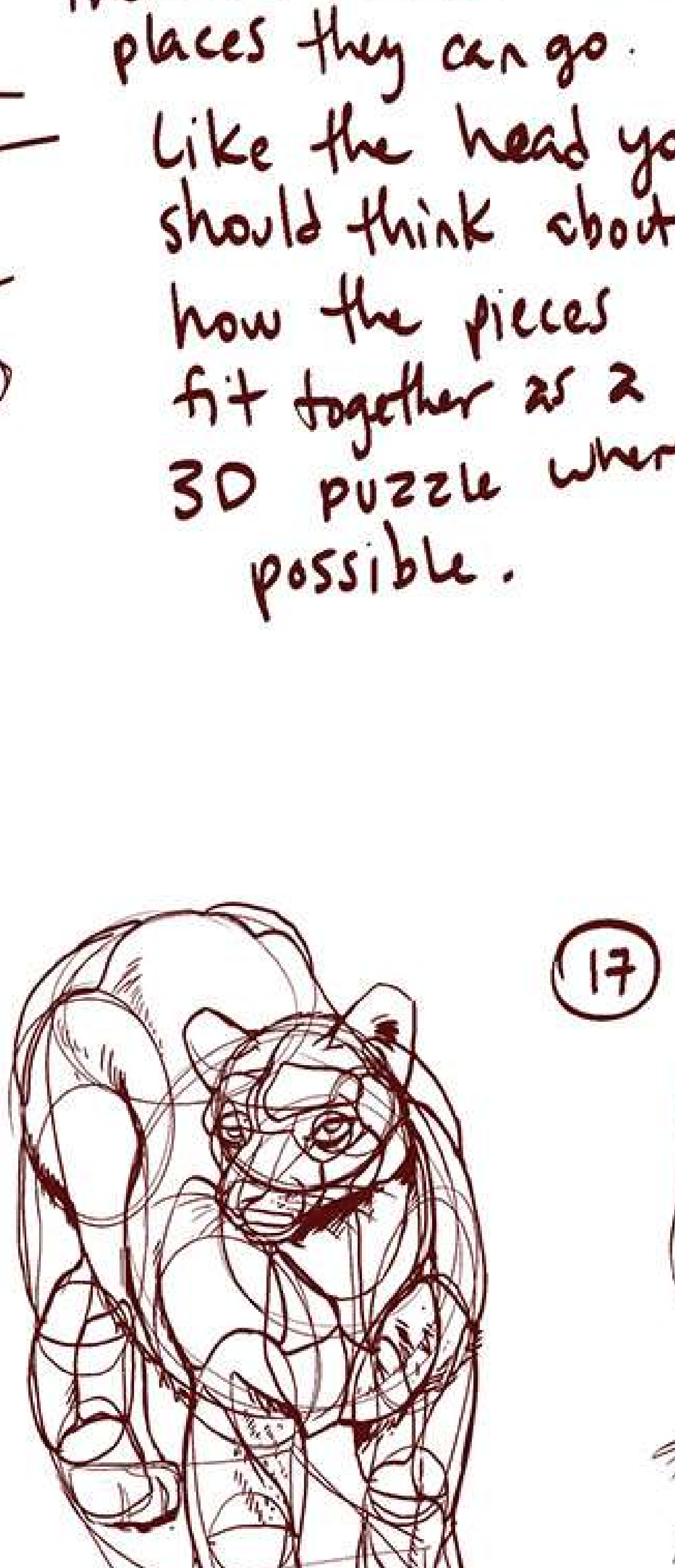
Keep building them up and don't be afraid to draw through your forms.

DETAIL, LINE WEIGHT, CAST SHADOWS, TEXTURE.

If you've done your job right, your drawing is probably going to be hard to make heads-or-tails of. That's fine, since these drawings are all EXERCISES to develop your construction and spatial reasoning skills. Still, line weight and cast shadows can help clarify how forms overlap one another.

DON'T OVERDO IT WITH TEXTURE/DETAIL. It is not important and can contradict your construction.

⑯



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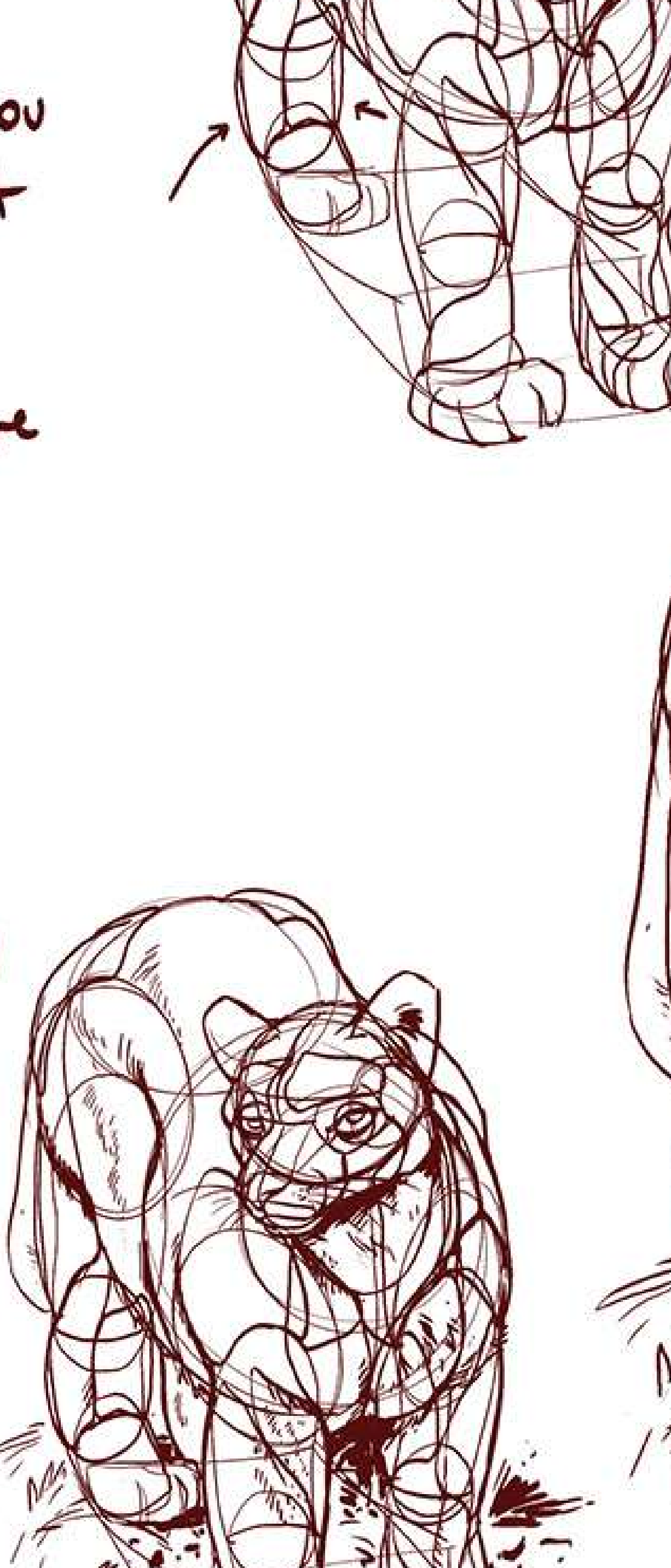
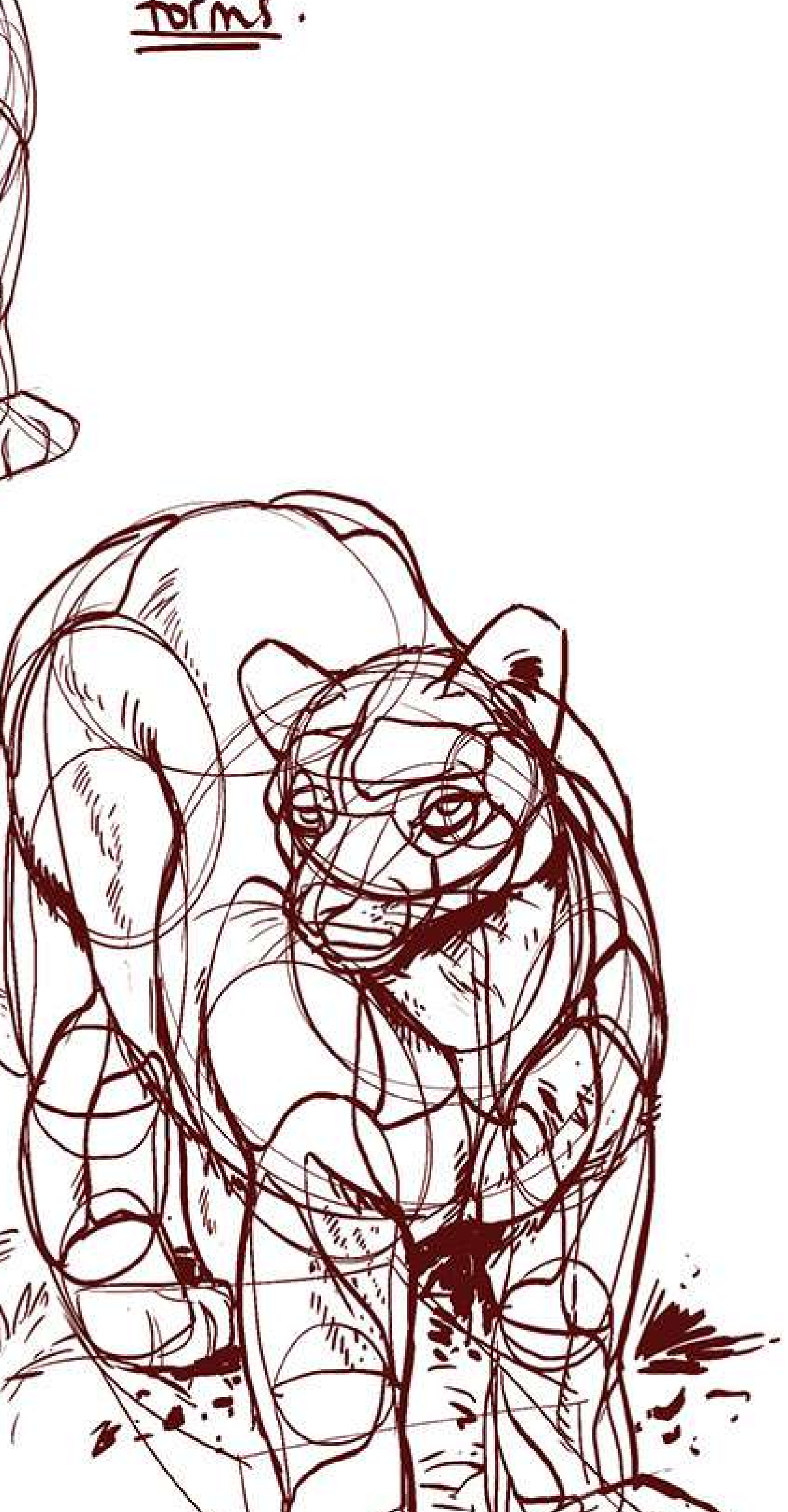
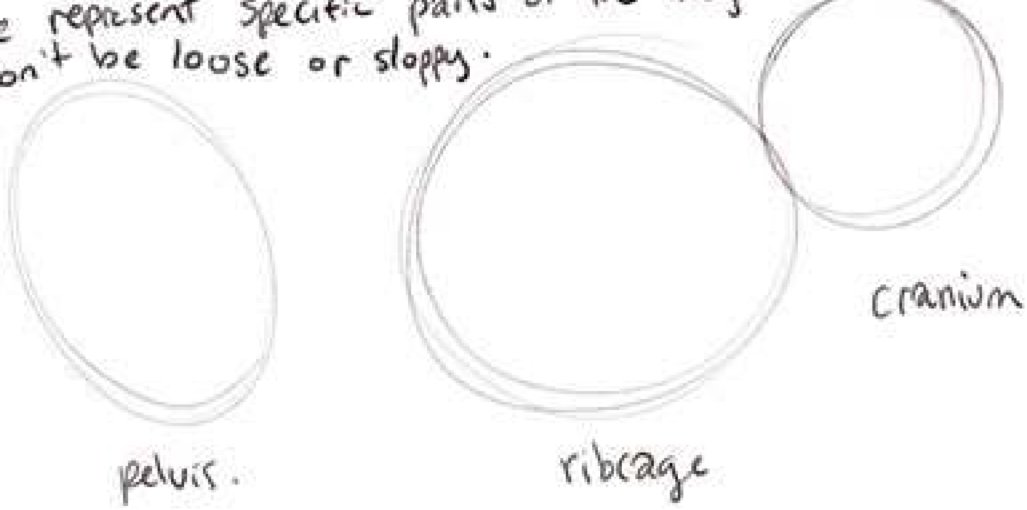
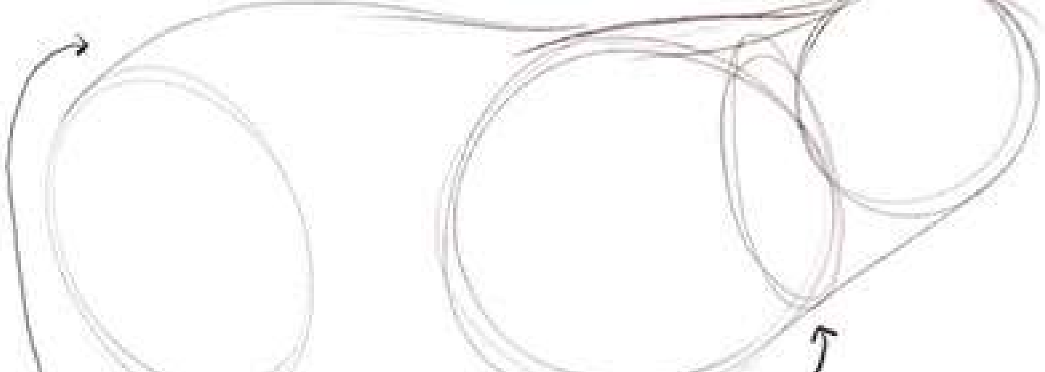




Start w/ your major masses.
These represent specific parts of the body.
Don't be loose or sloppy.

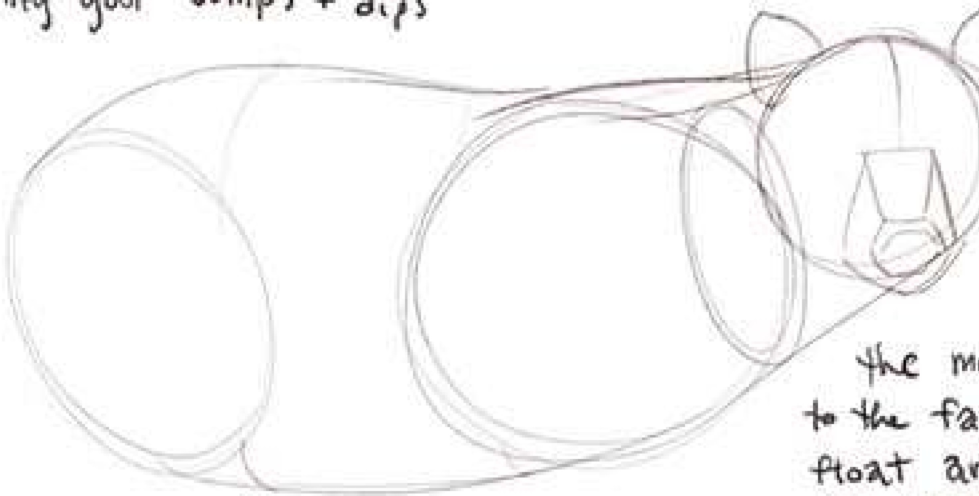


Connect them together.



study reference carefully to identify your bumps + dips

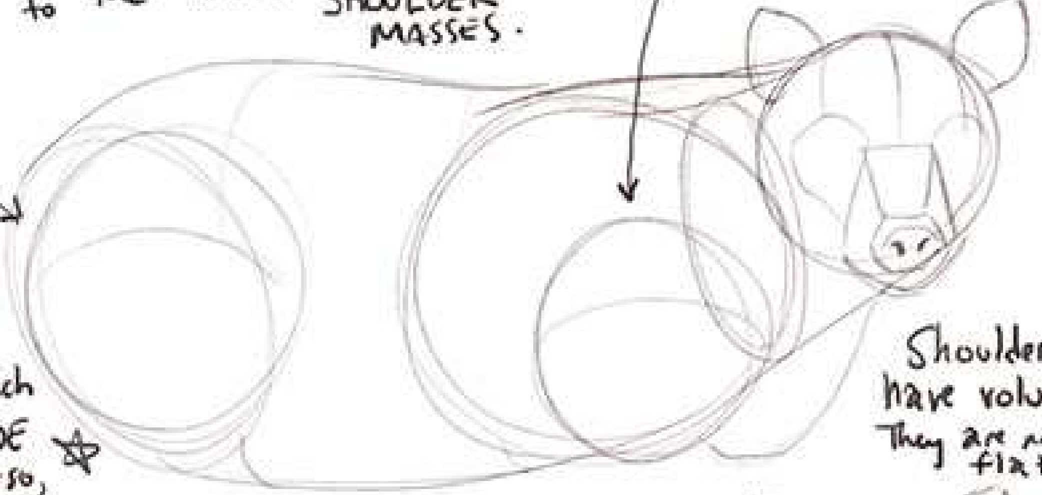
note where/how the neck + torso intersect.



the muzzle attatches to the face. It does not float arbitrarily. These are intersecting 3D forms.

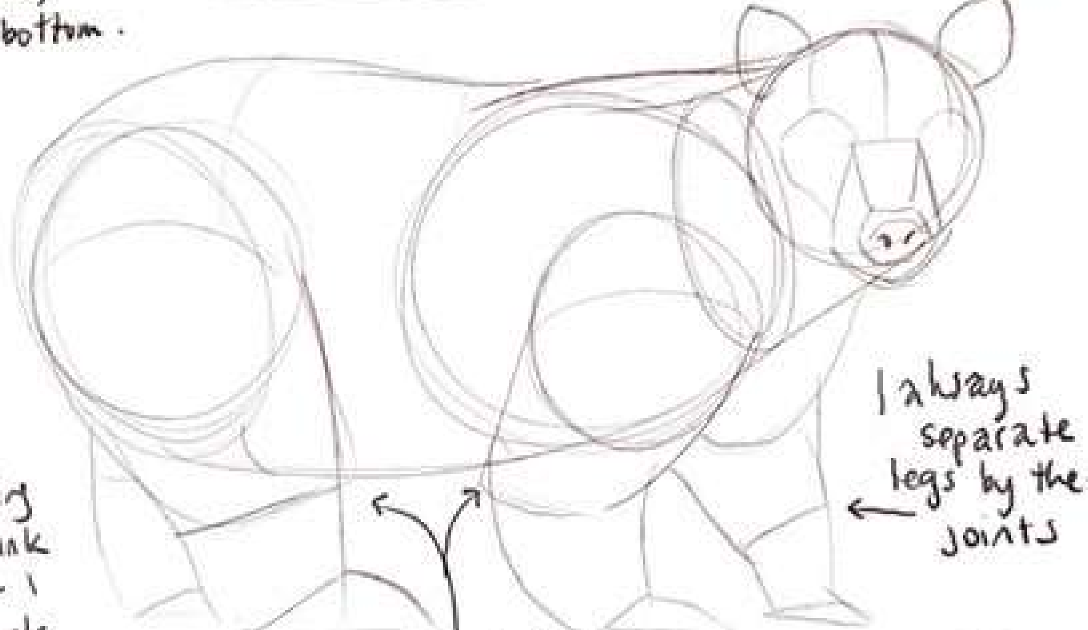
You can add a few contour lines to help push your forms' volumes but DO NOT GO OVERBOARD.

To add legs, we first think about how they connect to the torso. SHOULDER MASSES.



☆ Legs attatch to the SIDE of the torso, NOT the bottom. ☆

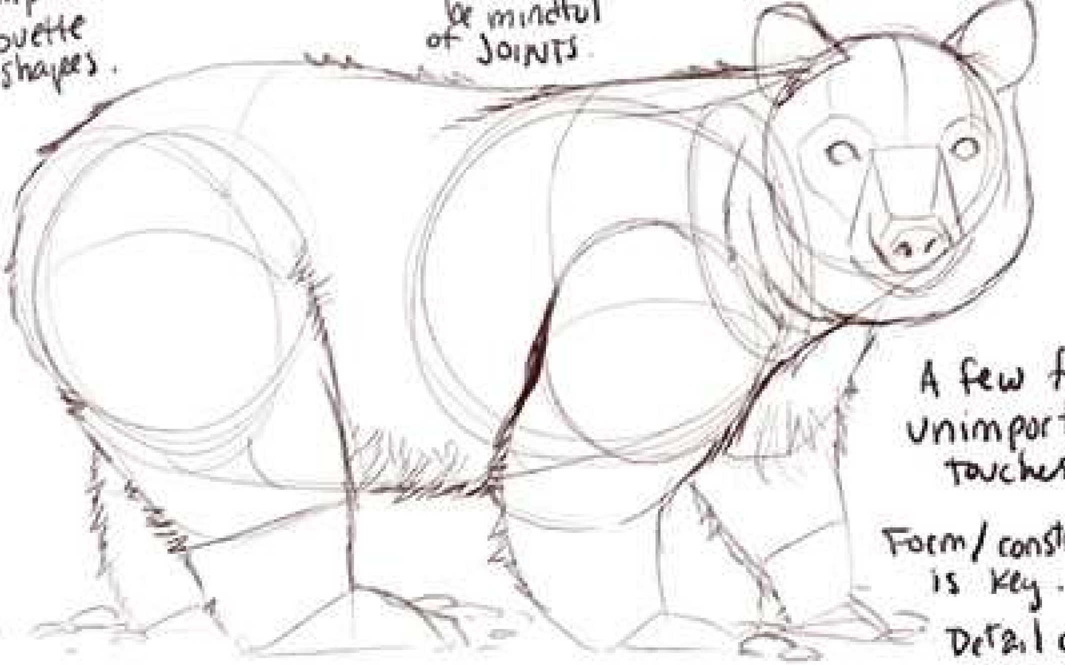
Shoulders have volume
They are not flat.



When drawing legs, I think in 3D, but I draw simple silhouette shapes.

be mindful of JOINTS.

I always separate legs by their joints



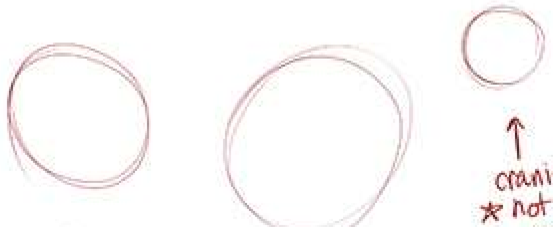
A few final unimportant touches.

Form/construction is key.
Detail does NOT matter.

★THINK IN 3D!

①

★ 3 starting balls.



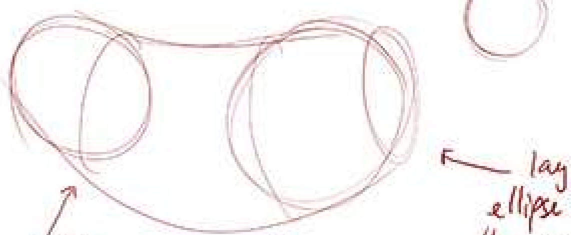
pelvis
★ stretch/rotate to fill out the pelvis

ribcage
★ stretch/rotate to fill out the ribcage.

cranium
★ not the whole head
★ always a sphere

②

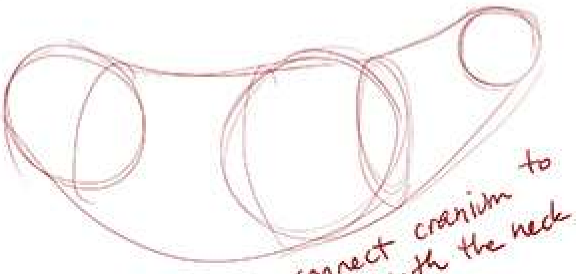
Connect the pelvis/ribcage into a sausage-torso. → Keep it simple & solid. Ignore all bumps/masses.



reinforce volume using contour curves.

lay in an ellipse for where the neck will intersect with the torso.

③

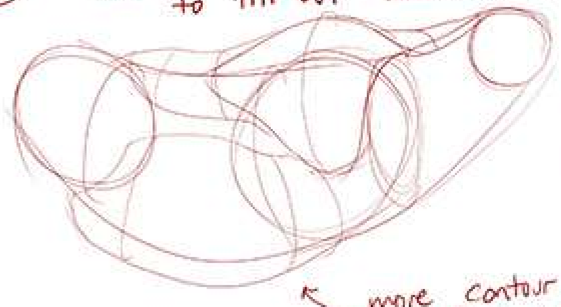


connect cranium to pelvis with the neck.

④

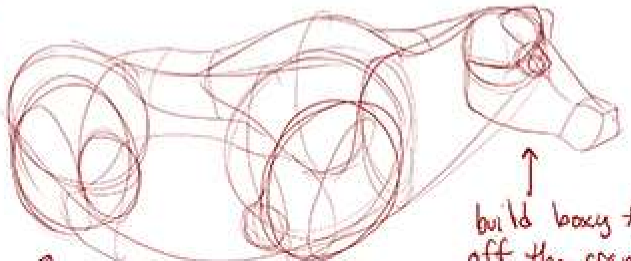
Add new organic forms where necessary to fill out additional masses.

Think of the "organic intersection" exercise from LESSON 2.



more contour curves to reinforce volumes.

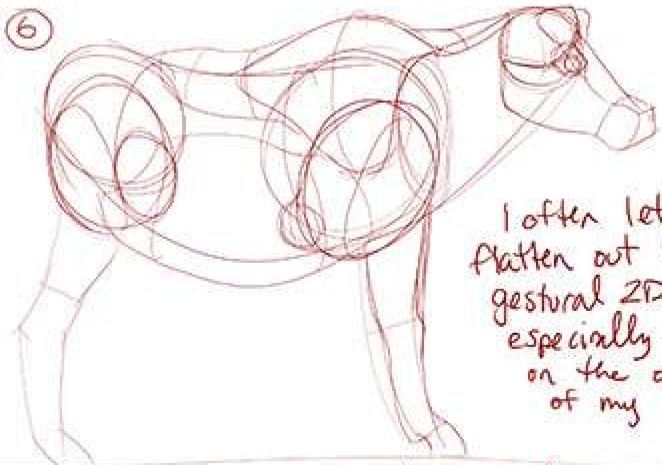
⑤



lay in the shoulder masses. Shoulders are often quite bulky, though are sometimes hidden by fur. Assume they're there, hidden or not.

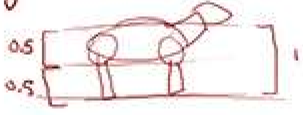
build boxy forms off the cranium to construct the head. Always separate the side/top/etc faces. THINK IN 3D.

⑥

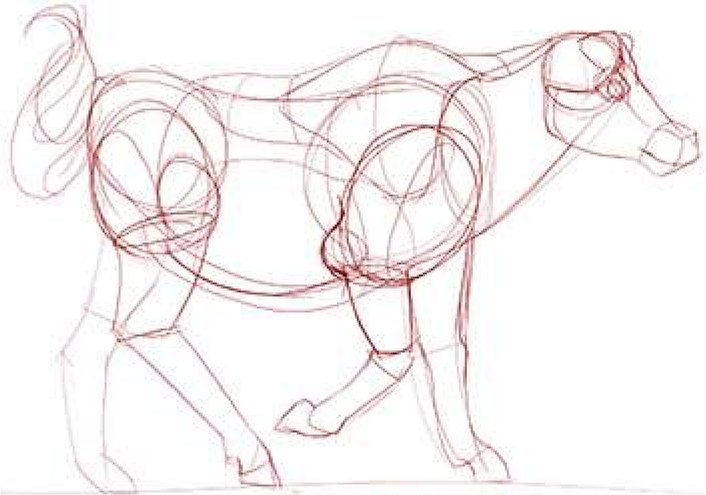


I often let the legs flatten out (using more gestural 2D shapes), especially the legs on the other side of my view.

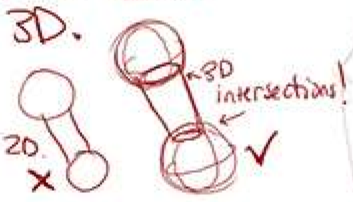
I looked at my reference and noted that the legs were roughly the height of the torso. Using this, I drew my ground level.



⑦

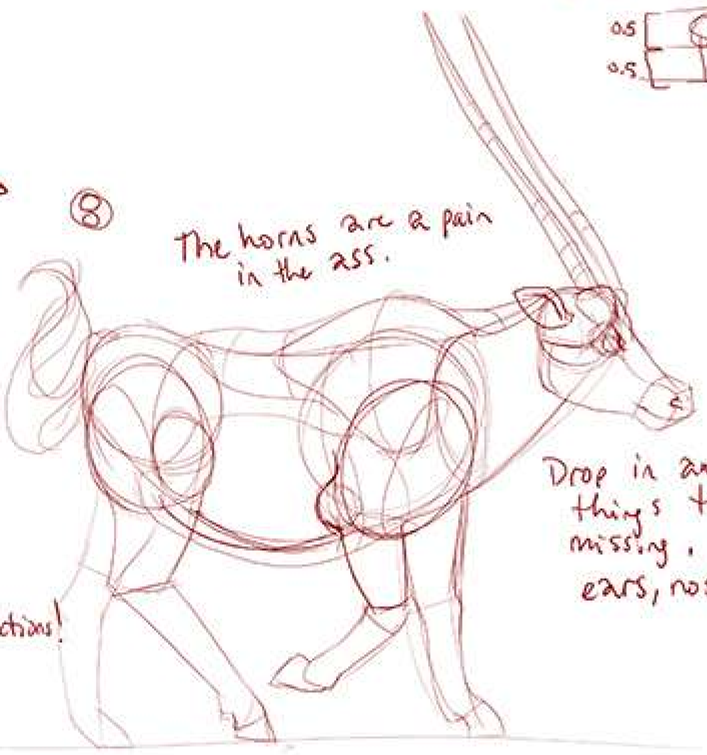


I draw the other legs fairly flat as well, EXCEPT where they connect to the shoulder. Always be aware of your intersections in 3D.



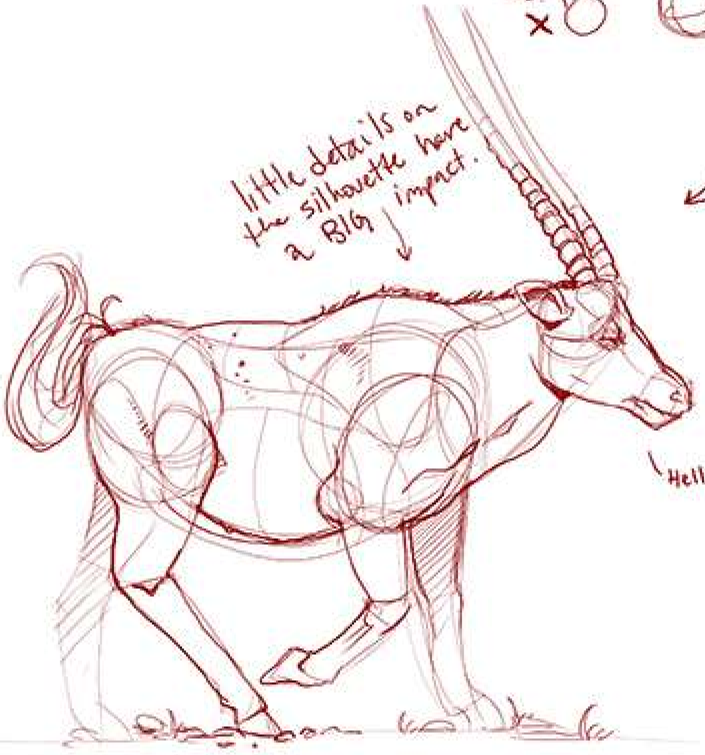
⑧

The horns are a pain in the ass.



Drop in any minor things that are missing, like the ears, nostrils.

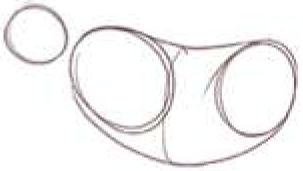
⑨


little details on the silhouette have a BIG impact.
Hello.

Cleanup, details, minor fixes.
If your construction is strong, you should be able to use a light touch when adding details/texture. Just a little here and there.

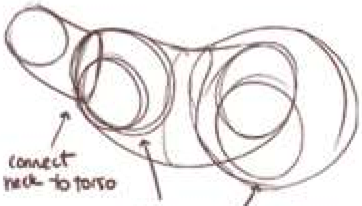
SAY HELLO TO MR. ORYX.

①



Basic masses, connect torso-sausage.

②

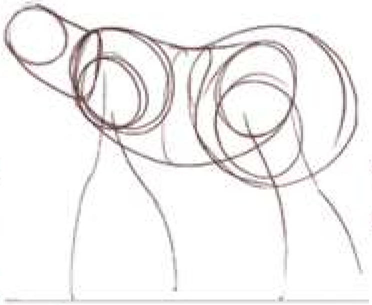


deposit junk in trunk.

connect neck to torso

figure out how/where legs connect to torso

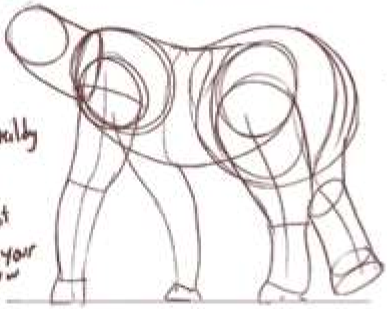
③



establish ground level first

plan out Jumbo's giant unwieldy legs, be gestural, not stiff. Let your lines flowwww

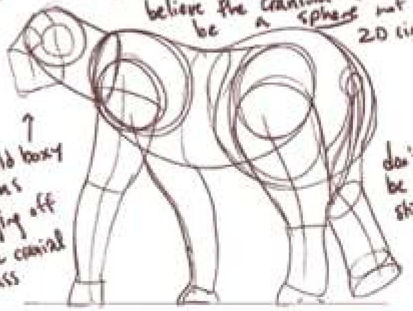
④



Build up those big bastards. I treat most of them as 2D shapes (2d tends to convey gesture better) but this one was all awkward ; had to be more 3D.

⑤

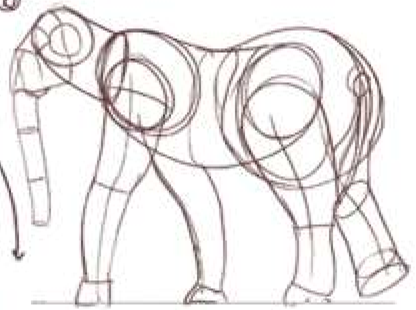
made sure I had enough to believe the cranium to be a sphere not a 2D circle



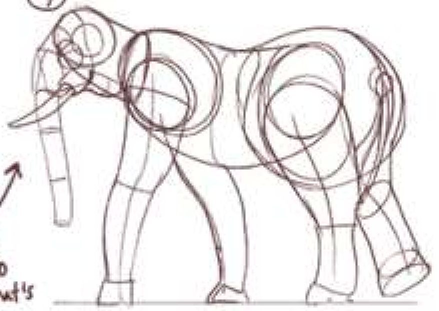
build boxy forms hinging off the cranial mass

don't be stiff

⑥



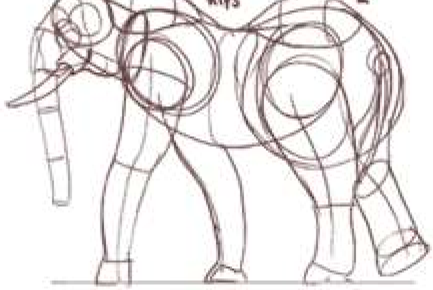
⑦



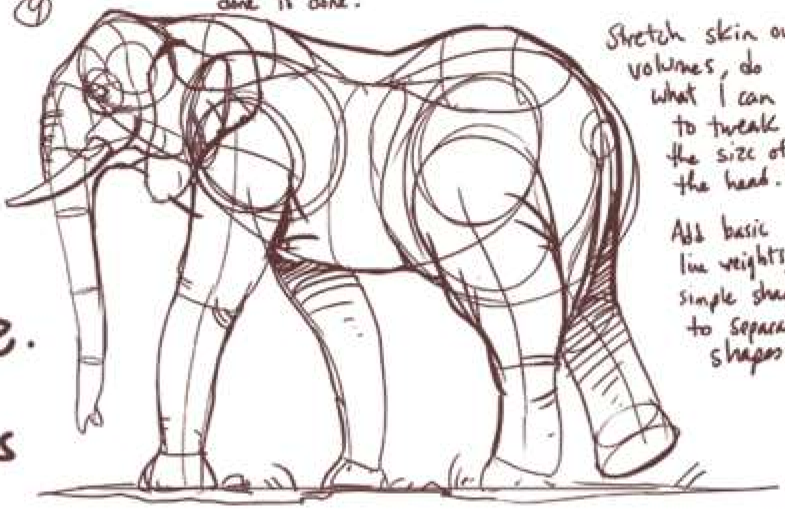
OH GOD THE HEAD'S TOO SMALL. What's done is done.

⑧

add some more mass/volume to the shoulders and hips



⑨



Stretch skin over volumes, do what I can to tweak the size of the head.

Add basic line weights, simple shadows to separate shapes.

ELEPHANTS: OBJECTIVELY TERRIBLE.

GIANT FRUMPY GREY BEASTS WITH SCROTAL MOM JEANS FOR SKIN.

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VIEW HOMEWORK SUBMISSIONS
SUBMIT HOMEWORK FOR REVIEW

The Challenge
- Drawing cylinders
- Aligning to the minor axis
- Degree shift
- 2 stages
- Constructing around a minor axis
- Checking for errors
- Constructing inside a box
- Checking for errors
- Reminders
- Assignment

250 Cylinder Challenge

The Challenge

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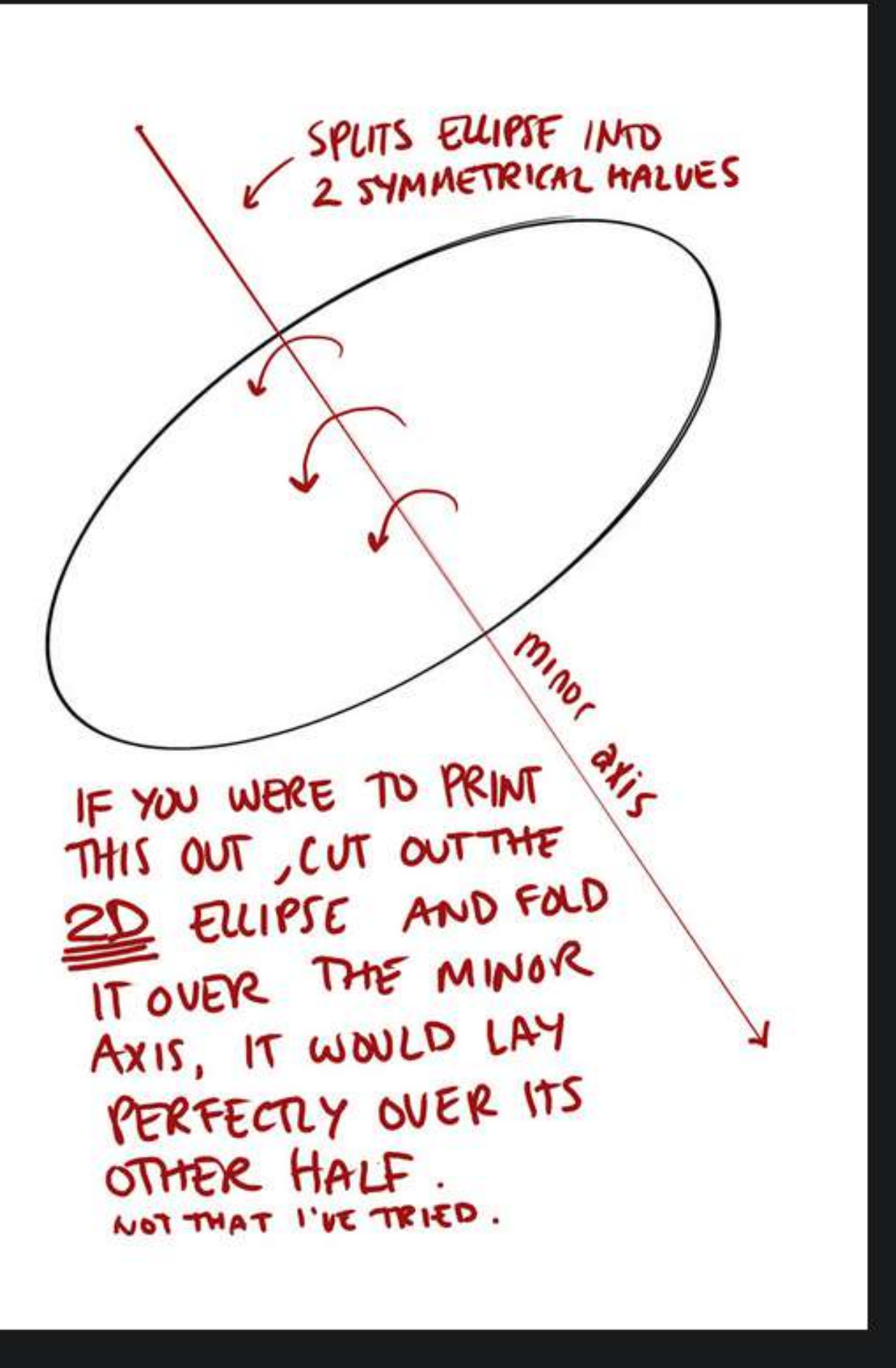
Drawing cylinders

In the vein of the 250 box challenge, we also have the 250 cylinder challenge. While these notes are certainly useful for the form intersections exercise, this challenge should not be started until *at least* Lesson 2 has been completed - although my recommendation is to hold off until you're done with Lesson 5, fitting the challenge between Lessons 5 and 6.

Similarly to the box challenge, while the meat of the task is a matter of drawing a lot of cylinders, there are a few things I want you to keep an eye on and a methodology for checking your errors that we will be employing.

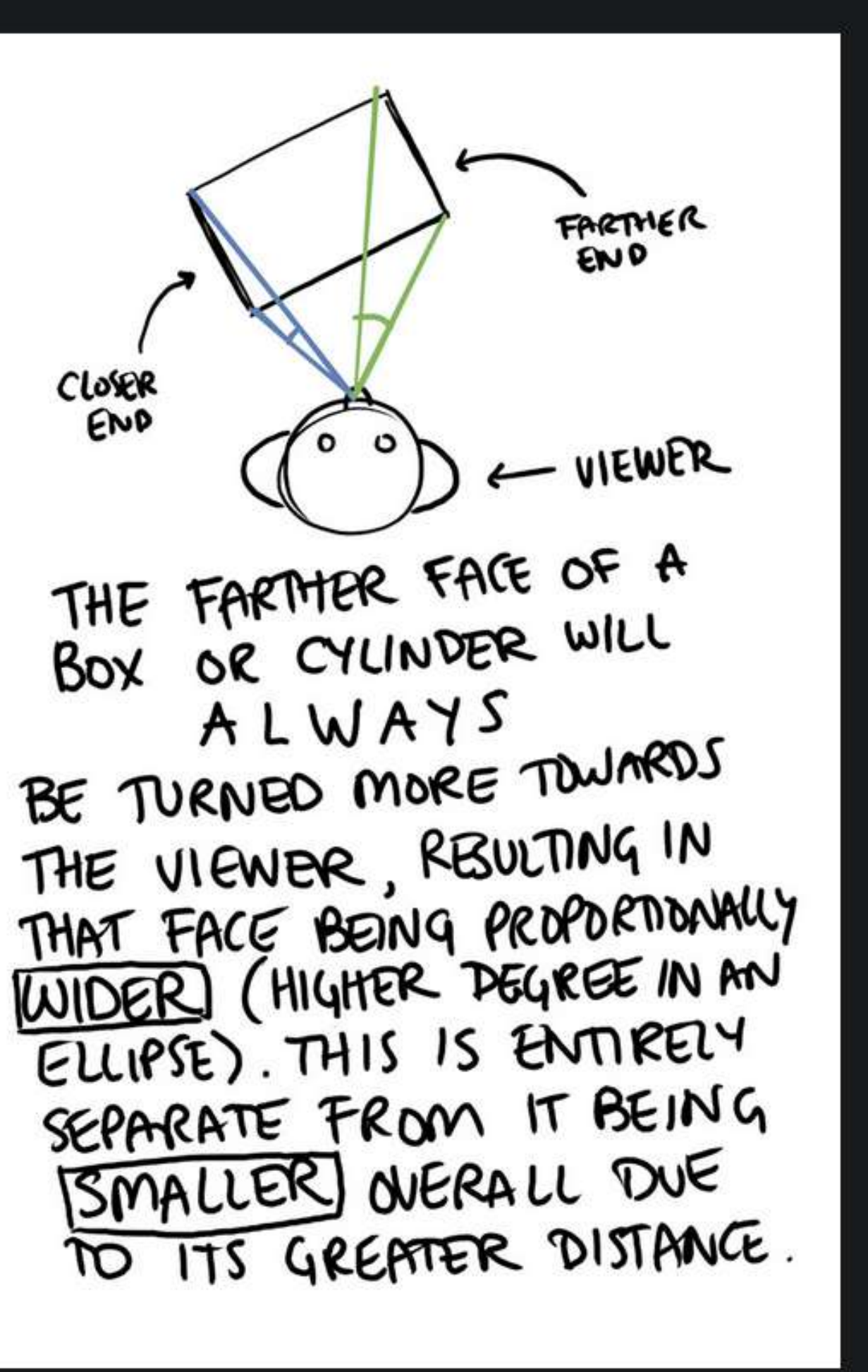
Aligning to the minor axis


SPLITS ELLIPSE INTO 2 SYMMETRICAL HALVES
minor axis
IF YOU WERE TO PRINT THIS OUT, CUT OUT THE 2D ELLIPSE AND FOLD IT OVER THE MINOR AXIS, IT WOULD LAY PERFECTLY OVER ITS OTHER HALF.
NOT THAT I'VE TRIED.

So one of the reasons we focus on cylinders enough to give them their own challenge is the concept of the minor axis. When we have a variety of cylinder-like forms (like the organic forms/sausages from lesson 2) as well as objects made up of many different cylinders (like a flower pot or a vase), the importance of having a minor axis to align to is pretty critical.

Throughout this challenge, you want to really push your ability to align ellipses to an arbitrary minor axis line. Every cylinder is going to require this - one minor axis, shared by the ellipses on either end of the form.

Degree shift


FARTHER END
CLOSER END
VIEWER
THE FARTHER FACE OF A BOX OR CYLINDER WILL ALWAYS BE TURNED MORE TOWARDS THE VIEWER, RESULTING IN THAT FACE BEING PROPORTIONALLY WIDER (HIGHER DEGREE IN AN ELLIPSE). THIS IS ENTIRELY SEPARATE FROM IT BEING SMALLER OVERALL DUE TO ITS GREATER DISTANCE.

This was introduced in the ellipses section from lesson 1 as well. Because of the fact that the viewing angle of the two different ends of the cylinder is not the same, the farther end of the cylinder is going to have its face oriented more towards us than the closer end, meaning its degree is going to be larger. Not by a significant amount, but enough to be vaguely noticeable.

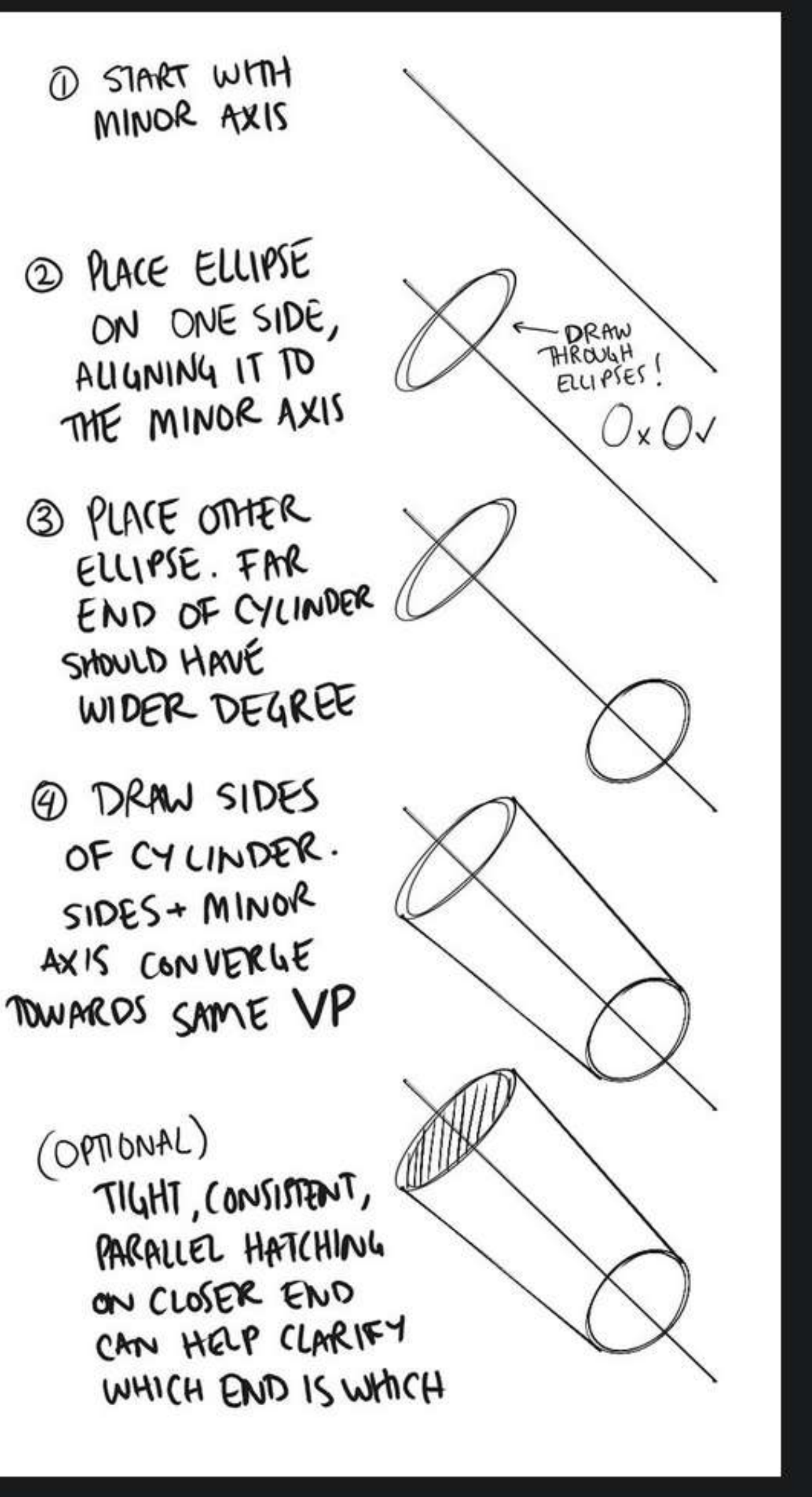
While we cannot *see* the farther ellipse, its degree still plays a role in how that end of the cylinder is curved. Not to mention the fact that we're still going to be drawing through our forms here, meaning drawing both ellipses in their entirety.

2 stages

This challenge is going to be done in two different stages, which will be explained below. Both have their own focus, and their own technique for checking for mistakes.

1. Constructing around an arbitrary minor axis
2. Constructing inside a box

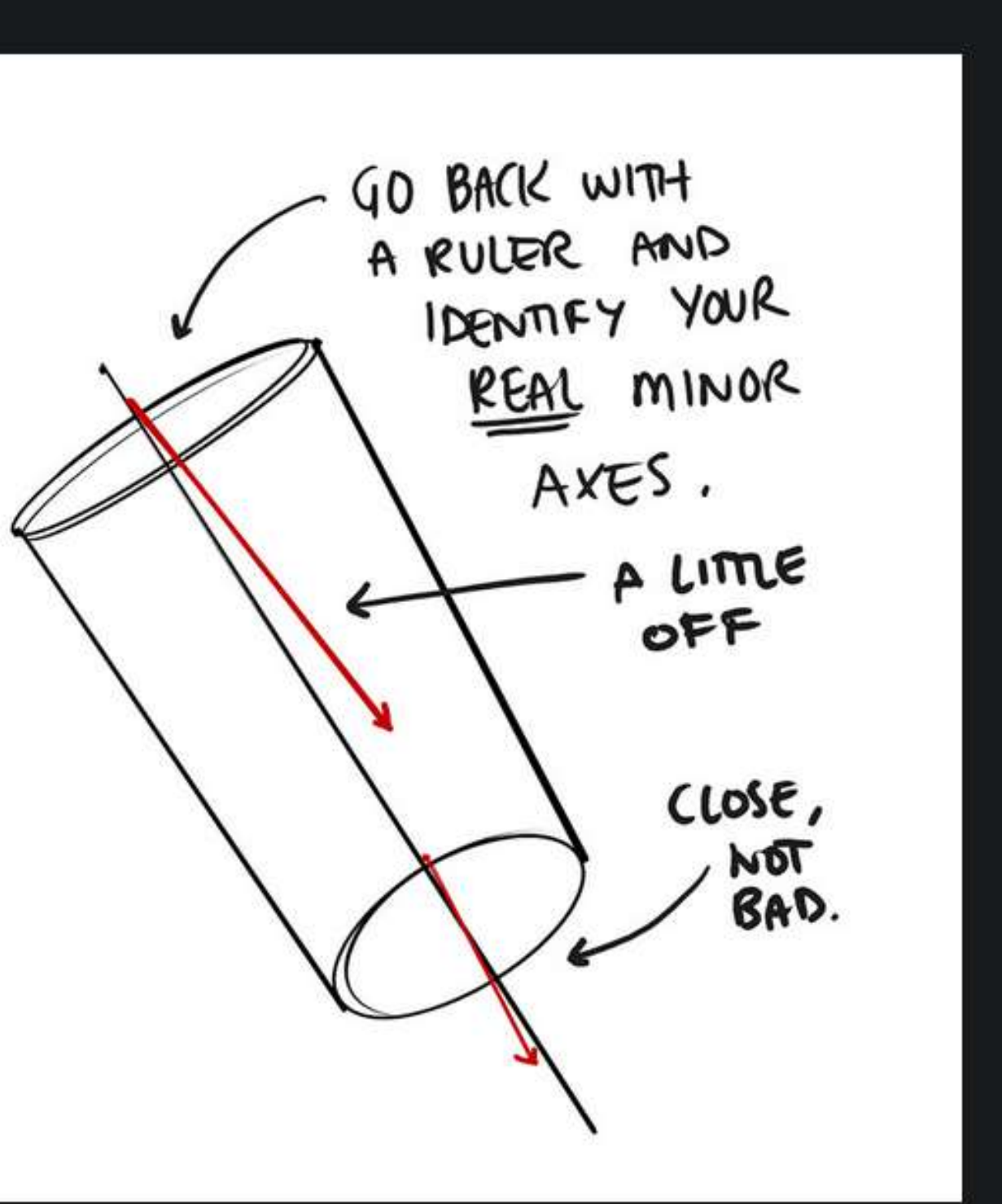
Constructing around a minor axis


① START WITH MINOR AXIS
② PLACE ELLIPSE ON ONE SIDE, ALIGNING IT TO THE MINOR AXIS
DRAW THROUGH ELLIPSES!
O× O✓
③ PLACE OTHER ELLIPSE. FAR END OF CYLINDER SHOULD HAVE WIDER DEGREE
④ DRAW SIDES OF CYLINDER. SIDES + MINOR AXIS CONVERGE TOWARDS SAME VP
(OPTIONAL) TIGHT, CONSISTENT, PARALLEL HATCHING ON CLOSER END CAN HELP CLARIFY WHICH END IS WHICH

This method is a good way to start and get familiar with what's involved in drawing your ellipses such that they align to a predetermined minor axis line.

1. We start with a minor axis line. Make it longer than the cylinder you want to draw. Use the ghosting method.
2. Place an ellipse towards one end. Don't place it right on the end point of the line - you want the whole line to cut through it, so you have a good sense of how they relate to one another.
3. Place the other ellipse on the opposite end. If this is the farther end, you're going to want to increase its degree slightly to account for the slight shift in viewing angle that will make the farther end orient a little more towards the viewer than the closer one. If it's the closer end, then decrease its degree a little instead.
4. Draw the sides of the cylinder, from ellipse to ellipse. Use the ghosting method. These lines will share a vanishing point with the minor axis line.

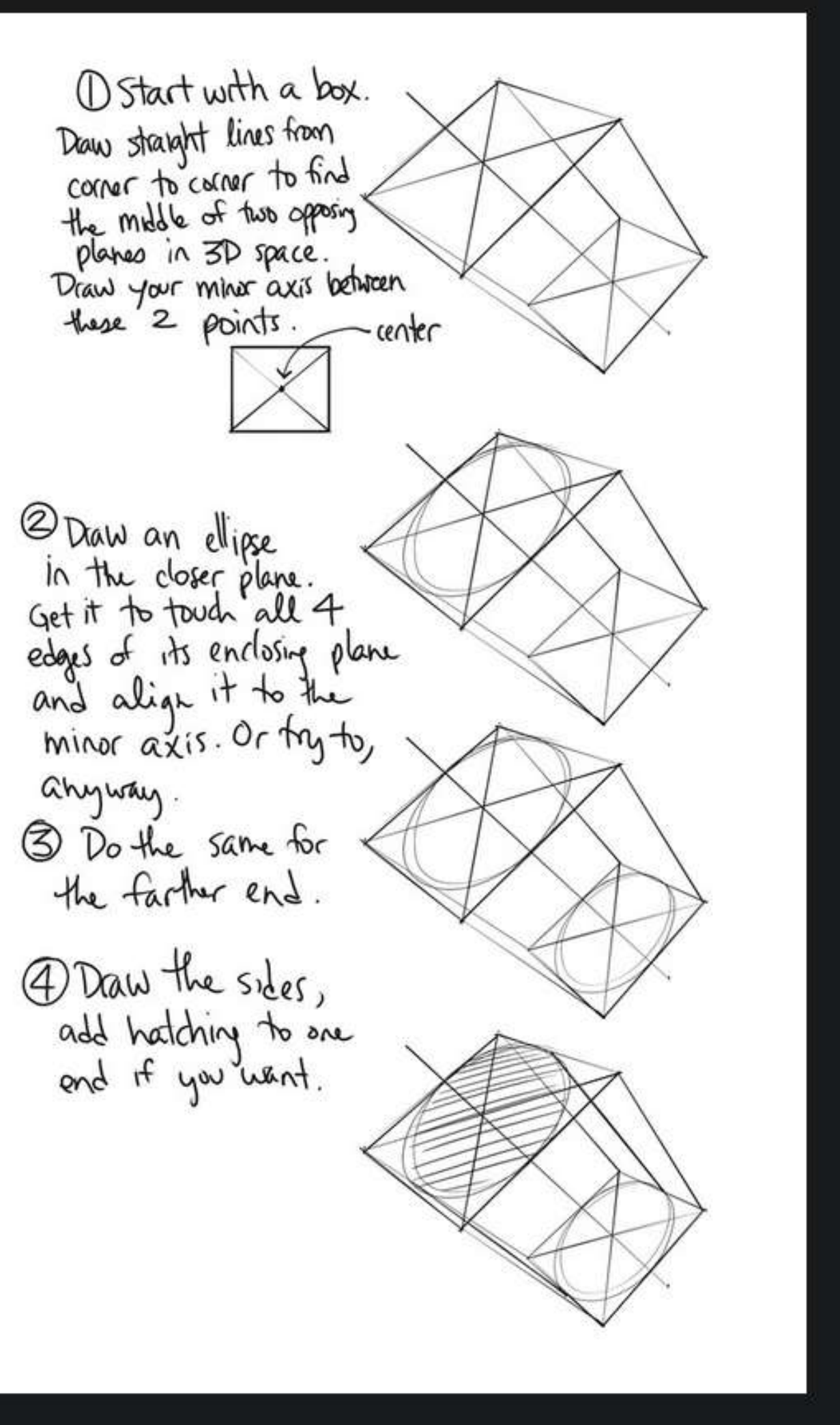
Checking for errors



So while we're striving to keep our ellipses lined up to our initial line, obviously we're going to make mistakes. Take a ruler and a pen of a different colour and look *really* close at each ellipse. Try to ignore the minor axis line that has already been drawn, and find the *real* line that cuts the ellipse into two equal, symmetrical halves down its narrower dimension.

Then compare this to the one you were shooting for. Being off by a little bit (like the farther ellipse in this example) isn't too bad. The closer ellipse is definitely something we'd want to work on however.

Constructing inside a box


① Start with a box. Draw straight lines from corner to corner to find the middle of two opposing planes in 3D space. Draw your minor axis between these 2 points.
center
② Draw an ellipse in the closer plane. Get it to touch all 4 edges of its enclosing plane and align it to the minor axis. Or try to, anyway.
③ Do the same for the farther end.
④ Draw the sides, add hatching to one end if you want.

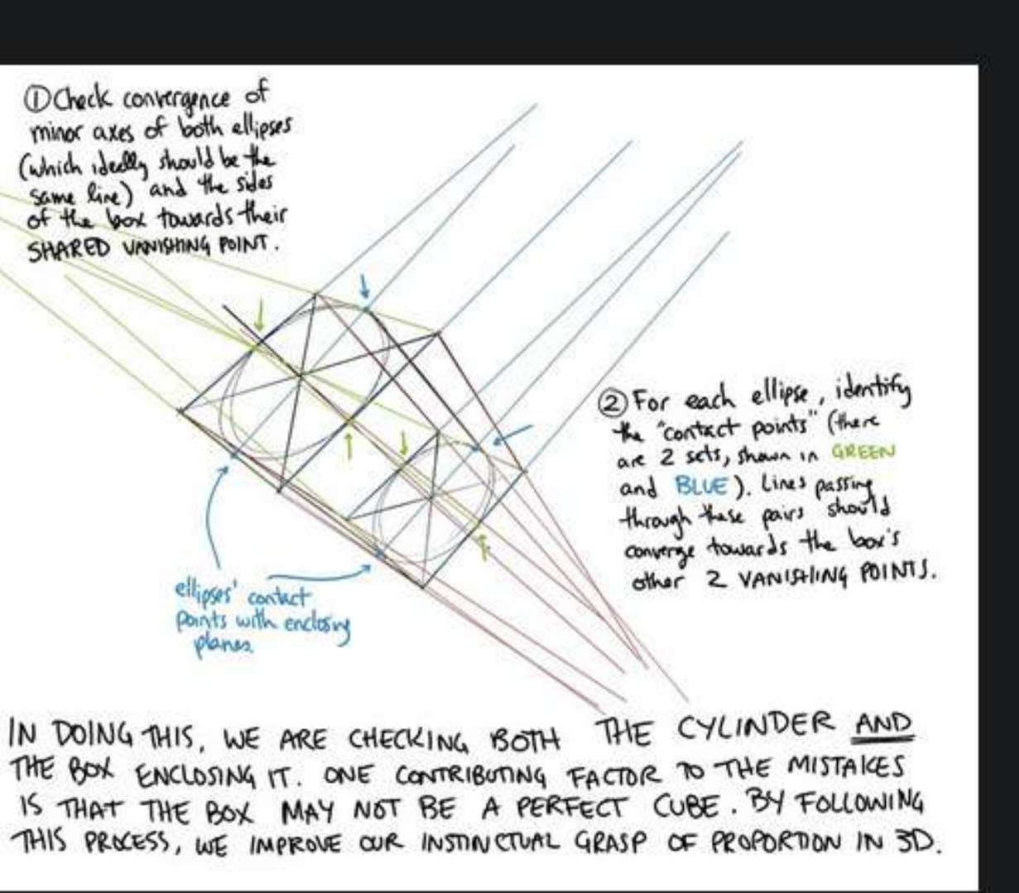
Now, drawing around a minor axis is pretty straightforward, but it's still quite difficult to work with in relation to other forms in a scene. Starting with a box however gives us a big advantage - it allows us to block in the space the cylinder will occupy in a manner that is much easier to relate to other forms that may be present.

Before we get started, I do want to point one thing out. When constructing a box to contain our cylinder, the relationships we'll be discussing below assume that the planes containing the ends of our cylinder are square (and therefore the ends of the cylinder will be circles in 3D space).

It's very likely that as you get started on this, your boxes will not meet this assumption, but this is completely fine. As we apply the error checking after the fact, we'll gradually identify places where those relationships aren't matching up. Just like testing the convergences back in the box challenge, this will allow us to tweak our approach both to the ellipses/cylinder and the enclosing box to yield better results as we continue working through the challenge.

1. Lets start with a box. Decide how your cylinder is going to be oriented within it and choose two opposing planes in which we'll be constructing our ellipses. We can find the center (in 3D space) of each of these planes by drawing from corner to corner. The center of the plane will be where the lines of the resulting X intersect. Draw a line that passes through the centers of both planes - this will be your minor axis.
2. Draw an ellipse in the closer end of this box. Try to get it to touch all four edges of the plane, while keeping it aligned to the minor axis. This is not easy, so be patient with yourself if you make mistakes.
3. Do the same for the far end.
4. Draw the sides of the cylinder - these will share a vanishing point with your minor axis line, along with the sides of the box.

Checking for errors


① Check convergence of minor axes of both ellipses (which ideally should be the same line) and the sides of the box towards their SHARED VANISHING POINT.
② For each ellipse, identify the "contact points" (there are 2 sets, shown in GREEN and BLUE). Lines passing through these pairs should converge towards the box's other 2 VANISHING POINTS.
ellipses' contact points with enclosing planes
IN DOING THIS, WE ARE CHECKING BOTH THE CYLINDER AND THE BOX ENCLOSING IT. ONE CONTRIBUTING FACTOR TO THE MISTAKES IS THAT THE BOX MAY NOT BE A PERFECT CUBE. BY FOLLOWING THIS PROCESS, WE IMPROVE OUR INSTINCTUAL GRASP OF PROPORTION IN 3D.

Similarly to how we check for errors in the 250 box challenge, we're going to be extending our lines and analyzing how they converge towards their intended vanishing points. The only difficulty here is figuring out which lines to check for the cylinder.

The easiest one is just our minor axes - same as the previous checking method, find the true minor axis for each ellipse.

The other two are a bit more difficult. For each ellipse, it's got four points at which it makes contact with the plane that encloses it. This is assuming that you've got your ellipse perfectly snug within its confines, and not spilling out of it or falling short. If either of these last two options are the case, you'll have to best-guess where it *would* have touched the edge. There's still value in this.

These contact points can be grouped into pairs, as shown in this diagram. The members of a given pair will sit on opposite edges on the plane.

Draw a line that passes through both members of a given pair of contact points and extend it back into space, towards its vanishing point. The VP will be the same as one of the box's other two remaining vanishing points, so you can check it directly against its lines.

What makes this so much trickier than the extension method for the boxes alone is that there's a lot that could be going wrong. First off, your minor axis alignment could be off. Secondly, you may not have drawn the ellipse to fit snugly within the box. Thirdly, the planes you drew your ellipses in may not really be squares in 3D space.

This error checking method serves to help us work on **gradually** building a more intuitive sense for the proportion of these forms. Don't get stressed if you're constantly turning up mistakes - it's entirely normal, especially with so many different factors to control. The point is to gradually get better.

The truth of the matter is that for the most part, for any given drawing, you only need to be *close enough*. These correction methods go much farther than that, making every single error excruciatingly obvious. This in turn helps us learn from them a lot better, but don't think that you're going to be held to this standard in your actual drawings.

Reminders

There are two related points that I've been noticing students missing, so hopefully this reminder will help address this issue.

- Firstly, though it's included in bold in the assignment section below, some students forget altogether to incorporate any variation in their rates of foreshortening, tending instead to stick to a single rate of foreshortening. To be extremely clear: **You MUST vary the rate of foreshortening for the first section** (the 150 cylinders around arbitrary minor axes), including both those with shallower convergences, and those with more dramatic, rapid convergences.
- Secondly - and often as an extension of the first point, I get a lot of submissions that forget what is explained here in the first point of the reminders of the 250 box challenge. **Do not draw your cylinders' side edges as being parallel on the page** - this is incorrect, as it means the student is forcing their vanishing point to infinity instead of allowing their desired orientation for the cylinder to determine where that vanishing point goes.

To explain that second point further, a vanishing point only goes to infinity when the set of edges it governs in 3D space run perpendicularly to the viewer's angle of sight - basically when those edges don't slant towards or away from the viewer through the depth of the scene.

Since this challenge has us rotating our cylinders freely and randomly, the chances of any of them aligning so perfectly (let alone many of them throughout such a small sample size of 150) is small enough that we can ignore it entirely. So, **be sure to have your side edges converging, even if only slightly in the case of shallow foreshortening**.

Generally when students exhibit these issues throughout their work, considerable revisions do get assigned. So be mindful of this, and make a habit of revisiting the instructions periodically throughout the assignment. I believe one of the major reasons students tend to forget to vary their rates of foreshortening is because they neglect to revisit the instructions.

The above also applies to the boxes of our cylinders in boxes (in the sense that we should not be drawing all of the boxes' edges to be parallel on the page).

Assignment

In order to complete this challenge, you must do the following, in either fineliner/felt tip pen (ideally) or ballpoint pen:

- 150 cylinders constructed around an arbitrary minor axis, doing the error checking method upon the completion of each page (not after each cylinder). **Be sure to vary the rate of foreshortening across your cylinders** throughout the set.
- 100 cylinders constructed in a box, doing the error checking method upon the completion of each page (not after each cylinder)

Applying Construction to Everyday Objects >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Pentel Pocket Brush Pen

This is a remarkable little pen. Technically speaking, any brush pen of reasonable quality will do, but I'm especially fond of this one. It's incredibly difficult to draw with (especially at first) due to how much your stroke varies based on how much pressure you apply, and how you use it - but at the same time despite this frustration, it's also incredibly fun.

Moreover, due to the challenge of its use, it teaches you a lot about the nuances of one's stroke. These are the kinds of skills that one can carry over to standard felt tip pens, as well as to digital media. Really great for doodling and just enjoying yourself.

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  Form Intersections
  Center of a plane
  Subdividing
  Subdividing more
  Subdividing thirds
  Mirroring
  Orthographic plans
  Curves
  Homework and exercises

Bluetooth Speaker Demo
  Demo Video
  Reference
  Step by step

Wooden Barrel Demo
  Demo Video
  Reference
  Step by step

Computer Mouse Demo
  Demo Video
  Step by step

Lesson 6: Applying Construction to Everyday Objects

Overview

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Prerequisites

By this point, I expect you've completed up to lesson 5, as well as the following challenges:

- 250 box challenge
- 250 cylinder challenge

What you learn in these challenges will play an enormous role in the work for this lesson, as you'll primarily be manipulating boxes and cylinders, as well as forms that share similar properties to them.

About your tools

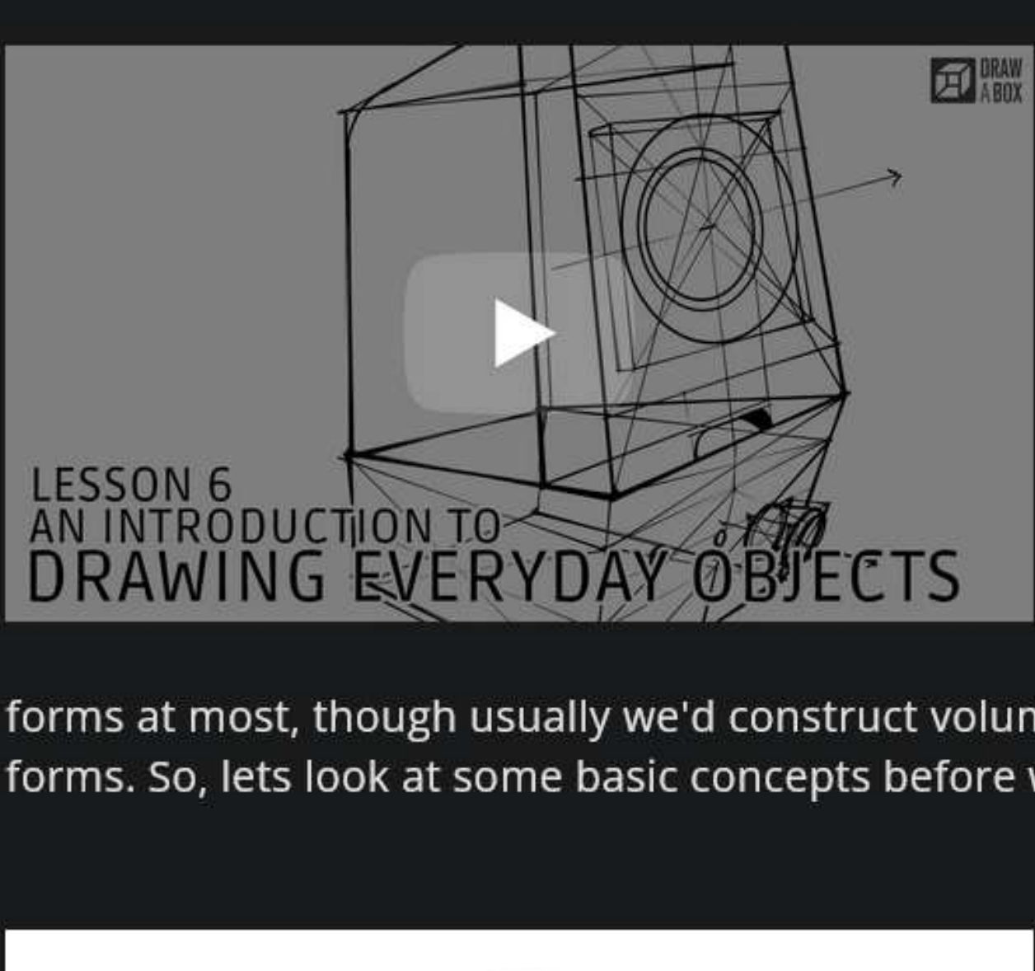
Up until lesson 5, I've been very adamant drawing everything freehand, with felt tip pens, and so on. And this has been for a good reason - it's important to maintain a certain degree of the right kinds of challenges to ensure that you guys gain as much as you can from each lesson.

This lesson, however, is going to be a little different. I am allowing, and in fact encouraging the use of the following:

- Ballpoint pen for your linework (don't switch pens to do any sort of "clean-up" pass - use the same pen through all your lines, including construction/box subdivision/etc)
- Brush pens for filling in large areas with solid black
- Rulers/straight edges for drawing precise construction lines
- Ellipse guides for constructing and aligning your ellipses
- French curves for any complex, curving lines

Whenever drawing freehand, I still want you to apply the methodology I've outlined in the past - the ghosting method, drawing through ellipses, and so on. That said, in this case it is inevitable that with all of the necessary construction lines, and the significance placed on precision, it's important for you to be able to use tools that will allow you to focus more on the meat of the lesson, which is really about the manipulation and construction of complex compound forms.

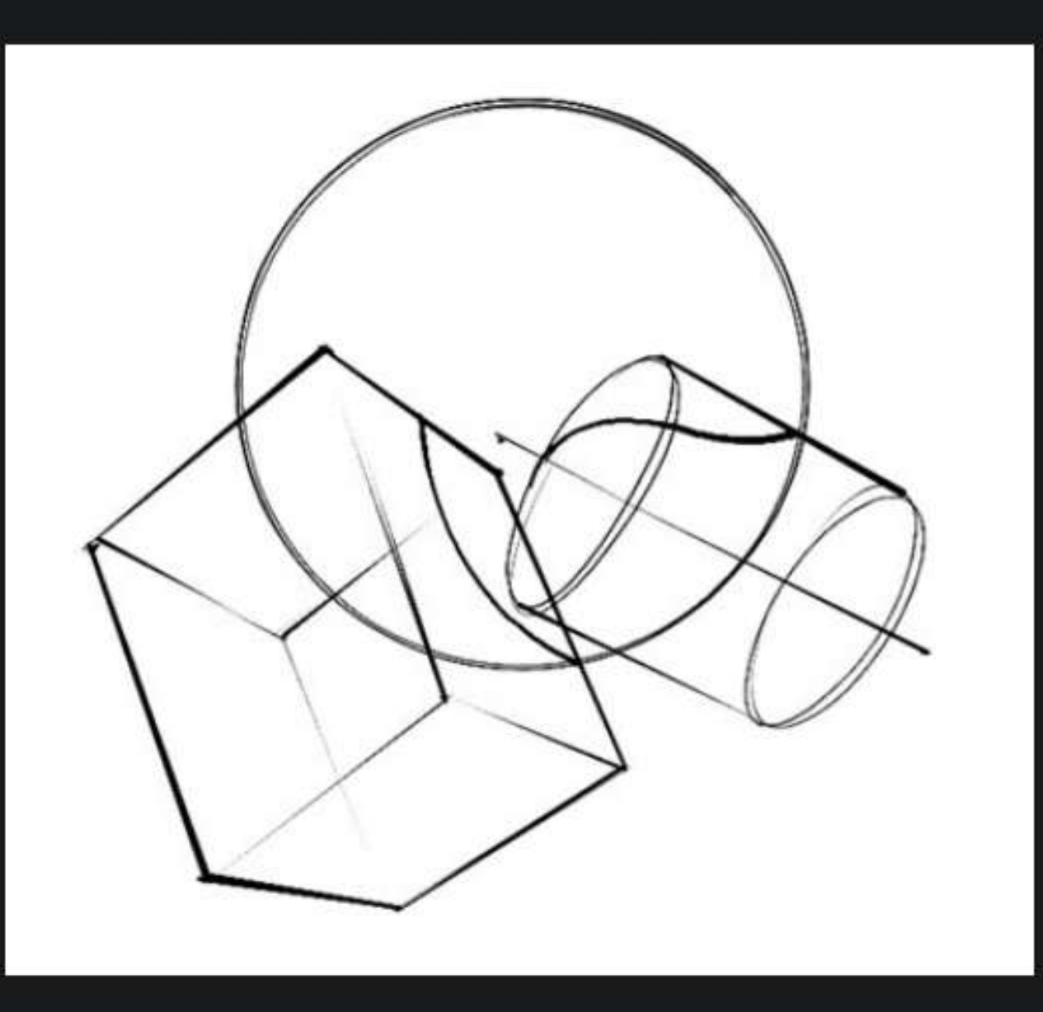
As before, do not use pencil or digital media.



Introduction

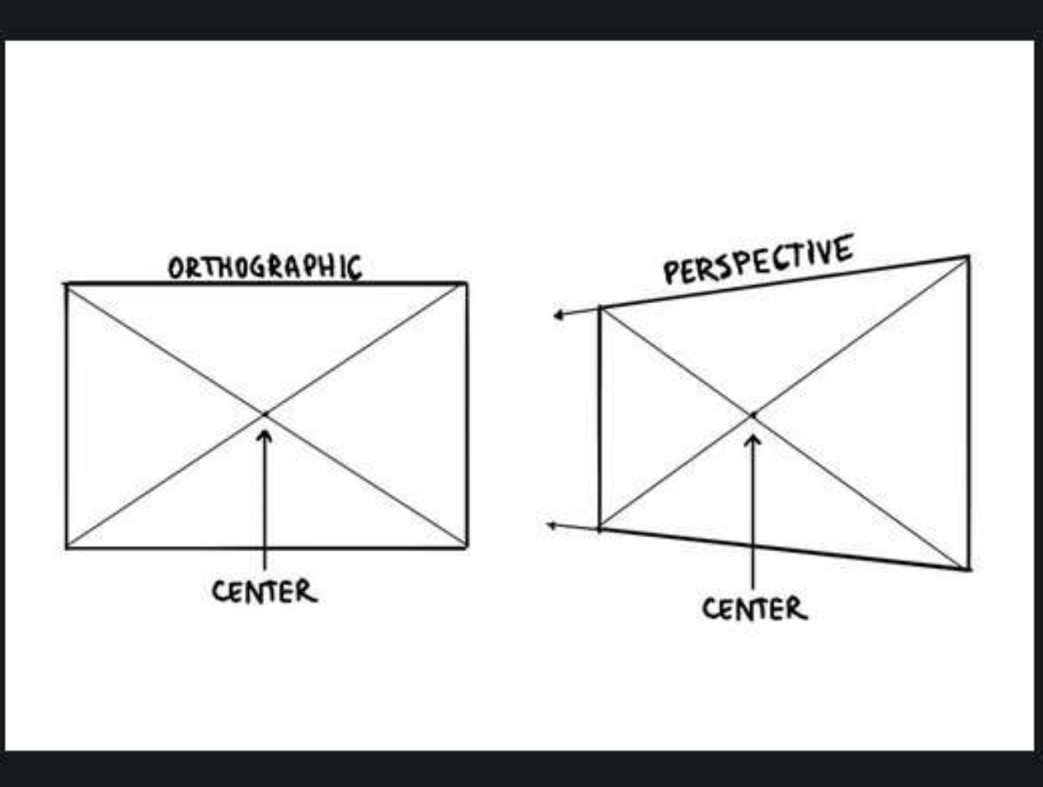
Originally, at this point I tackled 'hard surface objects' by diving into vehicles like tanks and locomotives. This time I've decided to add one more lesson to the list - every day objects. The vehicles will come in the next one, so we can work our way up to them.

The last handful of lessons all dealt with fairly organic subject matter. The constructions involved fairly fluid interpretations of geometric forms at most, though usually we'd construct voluminous blobs and then chisel them into planar forms. So, lets look at some basic concepts before we go into the demos.



Form Intersections

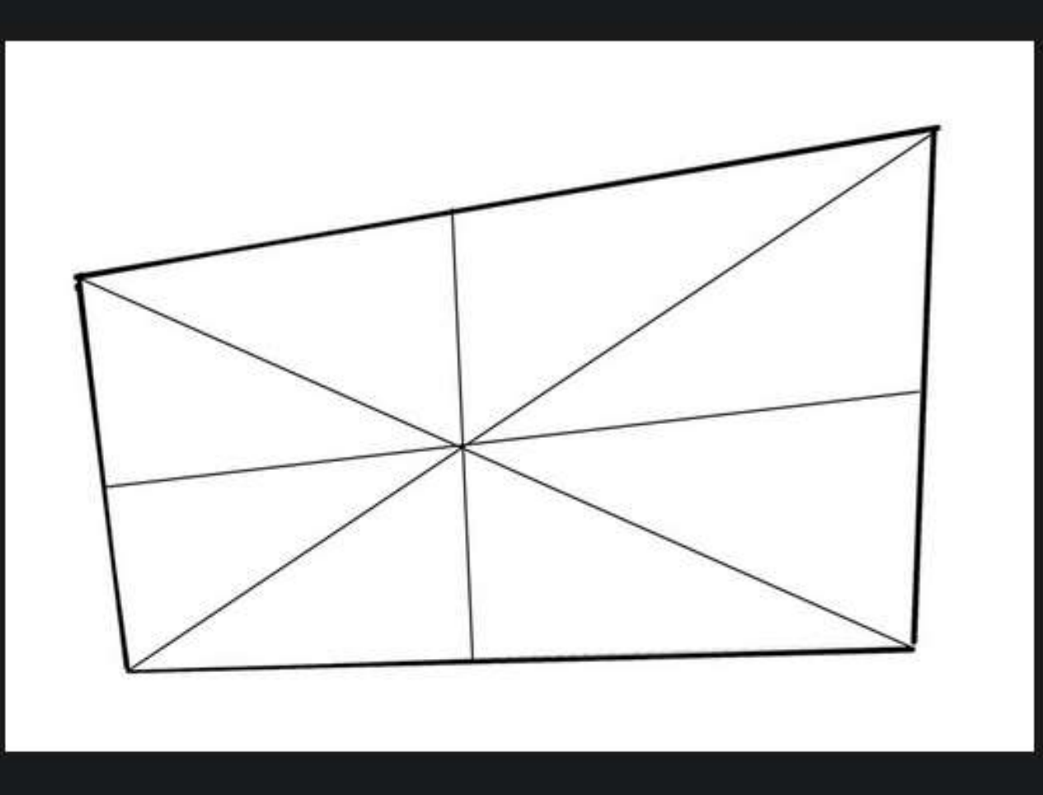
If you remember lesson 2's form intersections, this is going to be very similar. The only difference is that instead of arbitrarily dropping in forms and connecting them however you like, we're going to attempt to construct concrete objects. This means keeping an eye on the proportions and the positions of your forms.



Center of a plane

On the left, you'll see an invaluable technique for finding the center of a quadrilateral plane. Finding the intersection point of the two diagonals of your quad will give you its physical center.

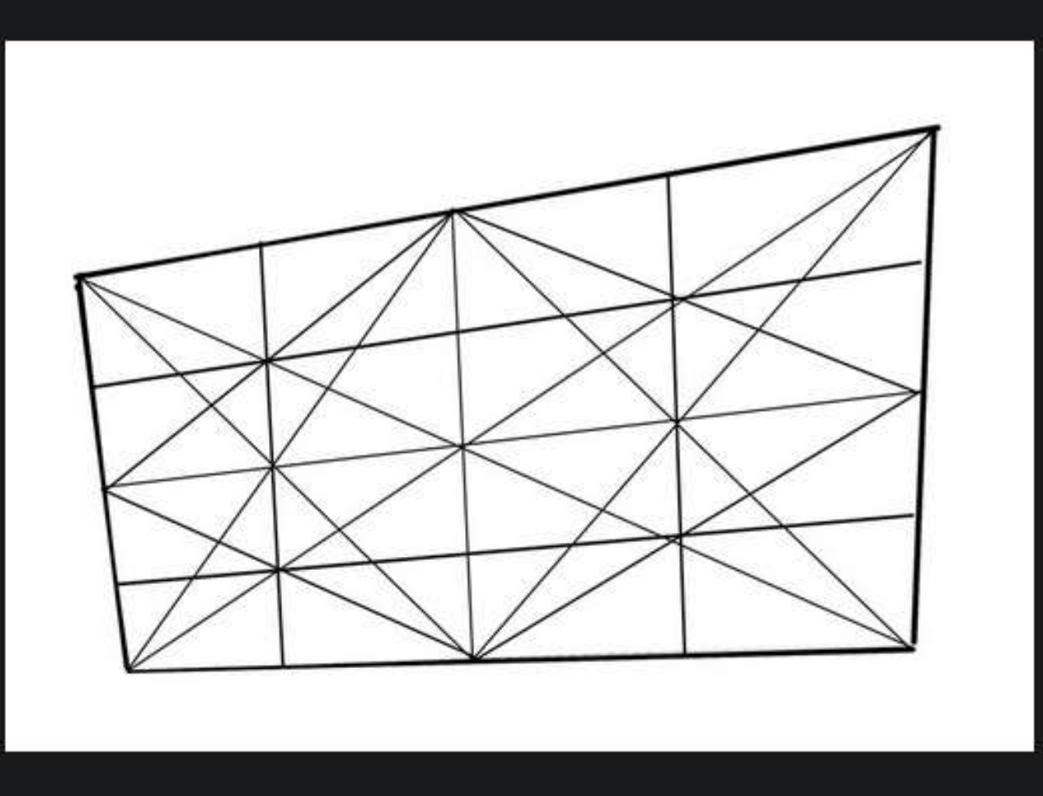
This is extremely useful. Due to the basic premise of perspective, we can't simply use a ruler to measure things out.



Subdividing

With the center of the plane found, you can draw lines that converge towards the same vanishing points as each of the other two sets of parallel lines that pass through our center point to subdivide the plane into four quadrants of equal size.

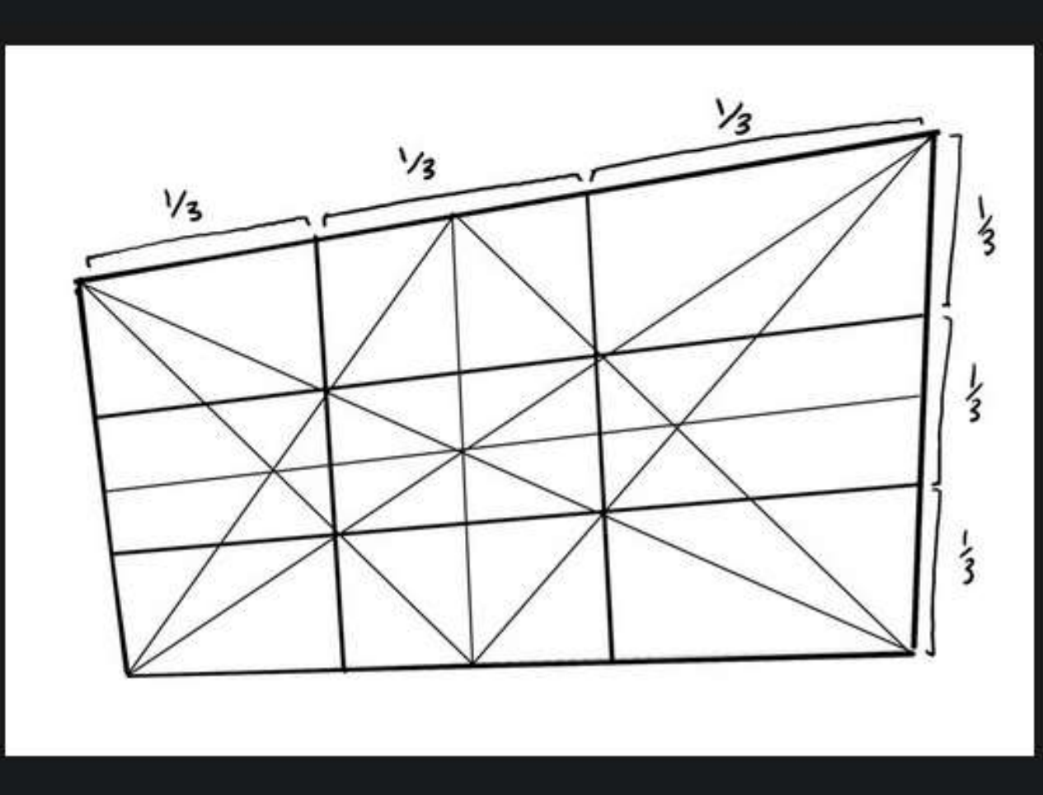
For more information on subdivision as a whole, you can check out the advanced box exercises from the box challenge page, which includes a full video discussing the basic technique and other points to be aware of.



Subdividing more

This technique can be used multiple times, as every time you find the center of a quad, you can use it in conjunction with vanishing points (whether explicit or estimated) to divide your quad into four smaller quads. You can then repeat the technique on those quads to further subdivide them.

This can be a great way to create a grid on a surface in perspective, which is a great way to pinpoint the correct proportions, or the accurate positioning of a detail or other intersecting form.

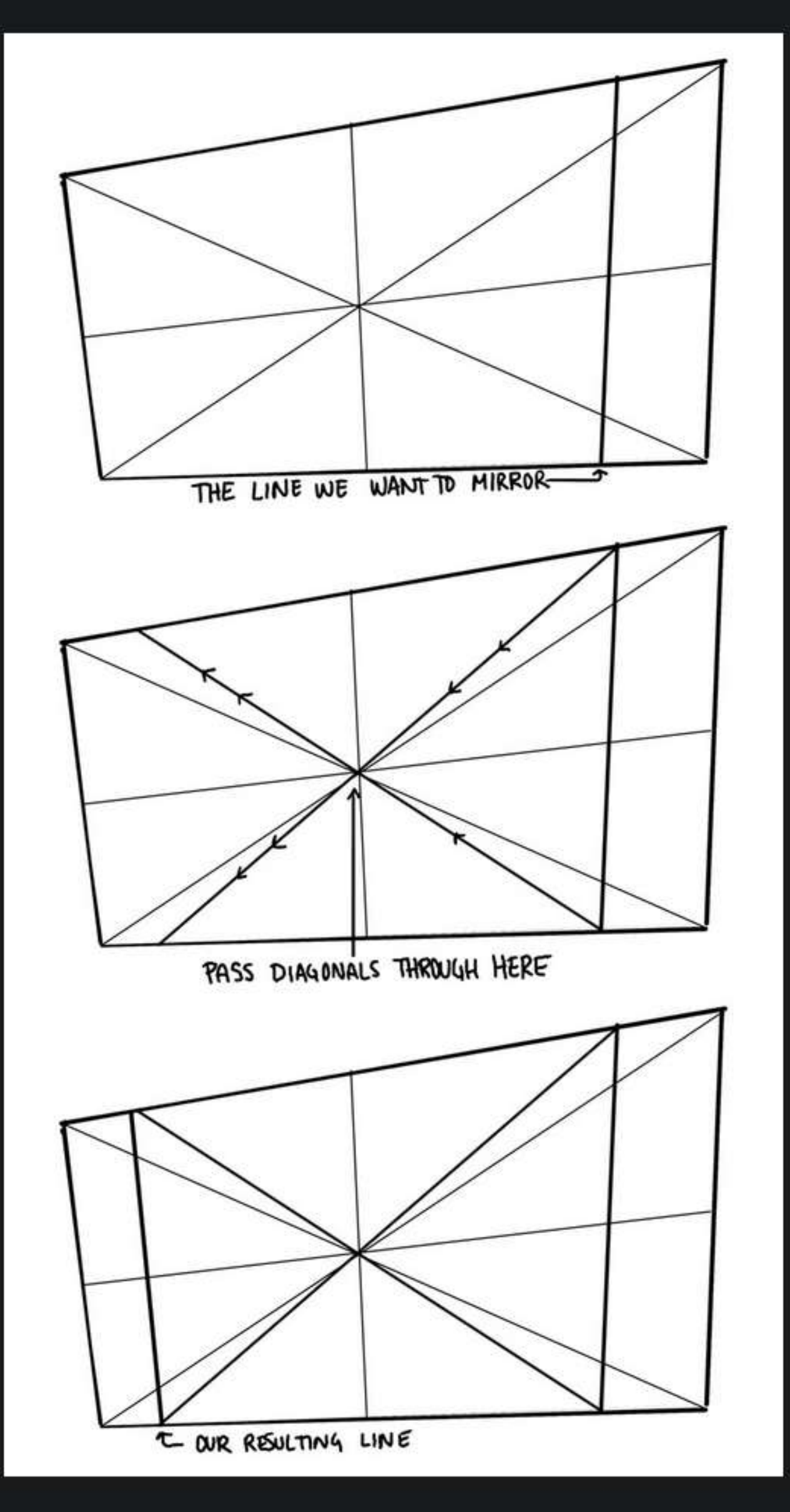


Subdividing thirds

That works great when you want to divide your planes up evenly, but what if you want to split them into thirds? This image explains how to go about it.

Basically you lay out the lines you'd need to subdivide your plane twice evenly, and in doing so, you'll find that your diagonals will also cross at four other points. These mark where your plane can be divided into thirds.

You can find information on how to subdivide your planes into many different fractions from this post on Andreas Aronsson's blog (we previously linked to the website, but it has since been taken down, so this is a PDF saved off the Internet Wayback Machine).



Mirroring

Another technique you'll need for this lesson is to be able to mirror a line across the center of a plane, from one side to the other. For example, say you have a line some distance in from the right side of a plane. This technique will allow you to draw another line the same distance away from the left side of the plane.

1. First, we find the center of the plane using the technique above.
2. Next, we draw a diagonal from the ends of the line we want to mirror, through the center of the plane.
3. Finally, we note the points where the diagonals intersect the edges of the plane and draw a line between these points.

You'll find yourself using this technique pretty frequently, and it comes up in some of the demonstrations as well.

Orthographic plans

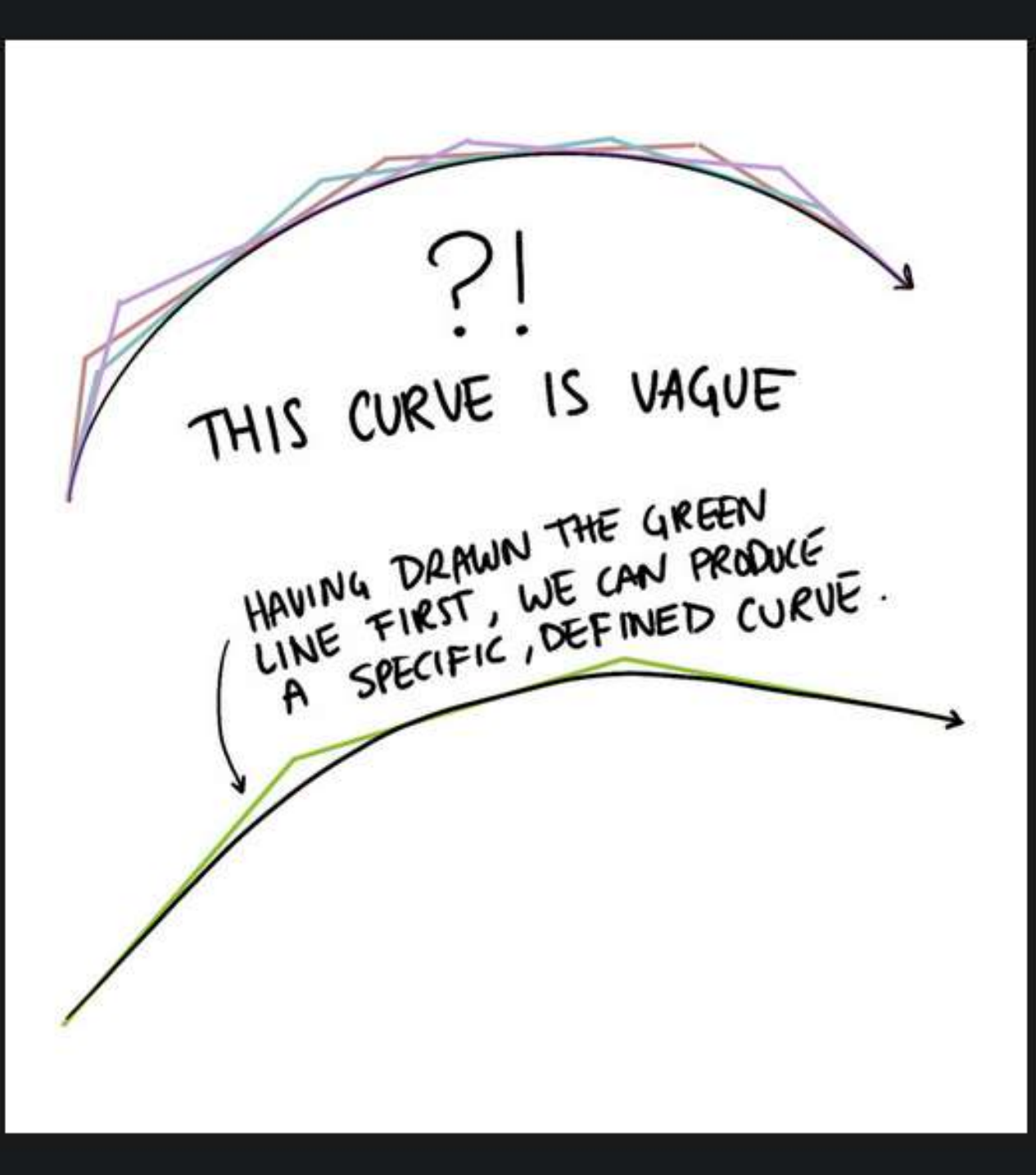
In the computer mouse demo, specifically this step we introduce the concept of using orthographic plans to help lay out our object.

As I've taught this concept and critiqued this lesson's homework over the years, I've come to realize how valuable this concept is towards the specific focus of this lesson - and have taken it much, much farther than originally explained.

Eventually, when the gradual overhaul of the lesson demos reaches this lesson this approach will be leveraged throughout the material, but in the meantime, I wanted to provide a detailed explanation on how this works. **You will find a demonstration on how to approach orthographic plans here**. Try to apply this throughout all of your object constructions for this lesson, **as well as those in Lesson 7**.

There are two key points in this demo to keep in mind:

- Every single action I've demonstrated there for this orthographic, two dimensional analysis of the object, can be reproduced in three dimensions. It relies either on subdivision, mirroring, or leveraging the points at which diagonals cross established horizontals or verticals. We can follow the exact same steps on a plane in 3D space, allowing us to transfer this information into 3D space... as long as we're patient about it.
- We are not *finding* the accurate locations for each landmark. Rather, we are *deciding* where they will go. The reference image is a source of information, but how we ultimately use it is up to us to decide, so we do have the freedom to say "I'm going to go with 2/5ths instead of 19/50ths". Of course the more of this we use, the further we may drift from the actual reference, but for our purposes in this course that is fine. What matters is that the plan we create here, and the construction we ultimately create in 3D space match up and follow the same process.


?!
THIS CURVE IS VAGUE
HAVING DRAWN THE GREEN LINE FIRST, WE CAN PRODUCE A SPECIFIC, DEFINED CURVE.

Curves

One important point to keep in mind here is the nature of curves. Curves are inherently vague - they capture the essence of several different configurations of straight lines, and in doing so, can very easily be used to *fudge* a construction. Given what we're dealing with here is often machine-cut with precision, the last thing we want is for our constructions to carry an air of approximation.

As such, we need to ensure that every single *decision* we make with our construction and linework is a clear and singular one.

As such, I want you to hold off on curves for as long as you can. Stick through most of your construction to squared edges. Then, as you come to the end, you can tightly round off corners as needed. This adherence to a specific configuration of straight lines until the final step will help imbue your drawing with a sense of clear intent.

You will also find a demonstration of this approach within a construction in how the handle was constructed on this mug. Be sure to employ this approach in your constructions, whenever dealing with any kinds of curves or rounded surfaces that don't conform to a basic primitive (like a sphere or a cylinder).

Homework and exercises

Before starting the homework, be sure to go through all of the demonstrations included in this lesson. I strongly recommend drawing along with them as well and following them closely when doing so.

Also, remember that this homework must be drawn from reference. When looking for reference, I recommend that you specifically look for those of a higher resolution. Google's image search tools allows you to limit your search to *large* images, and I recommend you take advantage of this. You frankly should also be working a great deal from life for this lesson, as you ought to be surrounded by fantastic subject matter, given that it's all about *everyday* objects.

The homework assignment for this section is as follows:

- 3 pages of form intersections, just like from lesson 2.
- 8 pages of everyday objects. Vary your subject matter and the nature of their construction - choose some that are largely cylindrical, some that are boxier, etc.

All the assigned work for this section should be done in ink. You may however **use ballpoint pens**, **rulers**, **ellipse guides** and **french curves** as needed. In this lesson we are no longer focusing on freehanding our lines, rather on our use of the kinds of marks we draw.

Bluetooth Speaker Demo >>>

Drawabox-Tested Fineliners (Pack of 10, $17.50 USD)

Let's be real here for a second: fineliners can get pricey. It varies from brand to brand, store to store, and country to country, but good fineliners like the Staedtler Pigment Liner (my personal brand favourite) can cost an arm and a leg. I remember finding them being sold individually at a Michael's for $4-$5 **each**. That's highway robbery right there.

Now, we're not a big company ourselves or anything, but we have been in a position to periodically import large batches of pens that we've sourced ourselves - using the wholesale route to keep costs down, and then to split the savings between getting pens to you for cheaper, and setting some aside to one day produce our own.

These pens are each hand-tested (on a little card we include in the package) to avoid sending out any duds (another problem with pens sold in stores). We also checked out a handful of different options before settling on this supplier - mainly looking for pens that were as close to the Staedtler Pigment Liner. If I'm being honest, I think these might even perform a little better, at least for our use case in this course.

We've also tested their longevity. We've found that if we're reasonably gentle with them, we can get through all of Lesson 1, and halfway through the box challenge. We actually had ScyllaStew test them while recording realtime videos of her working through the lesson work, which you can check out here, along with a variety of reviews of other brands.

Now, I will say this - we're only really in a position to make this an attractive offer for those in the continental United States (where we can offer shipping for free). We *do* ship internationally, but between the shipping prices and shipping times, it's probably not the best offer you can find - though this may depend. We also straight up can't ship to the UK, thanks to some fairly new restrictions they've put into place relating to their Brexit transition. I know that's a bummer - I'm Canadian myself - but hopefully one day we can expand things more meaningfully to the rest of the world.

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Wooden Barrel Demo
- Demo Video
- Reference
- Step by step

Computer Mouse Demo
- Demo Video
- Step by step

Lesson 6: Applying Construction to Everyday Objects

Bluetooth Speaker Demo

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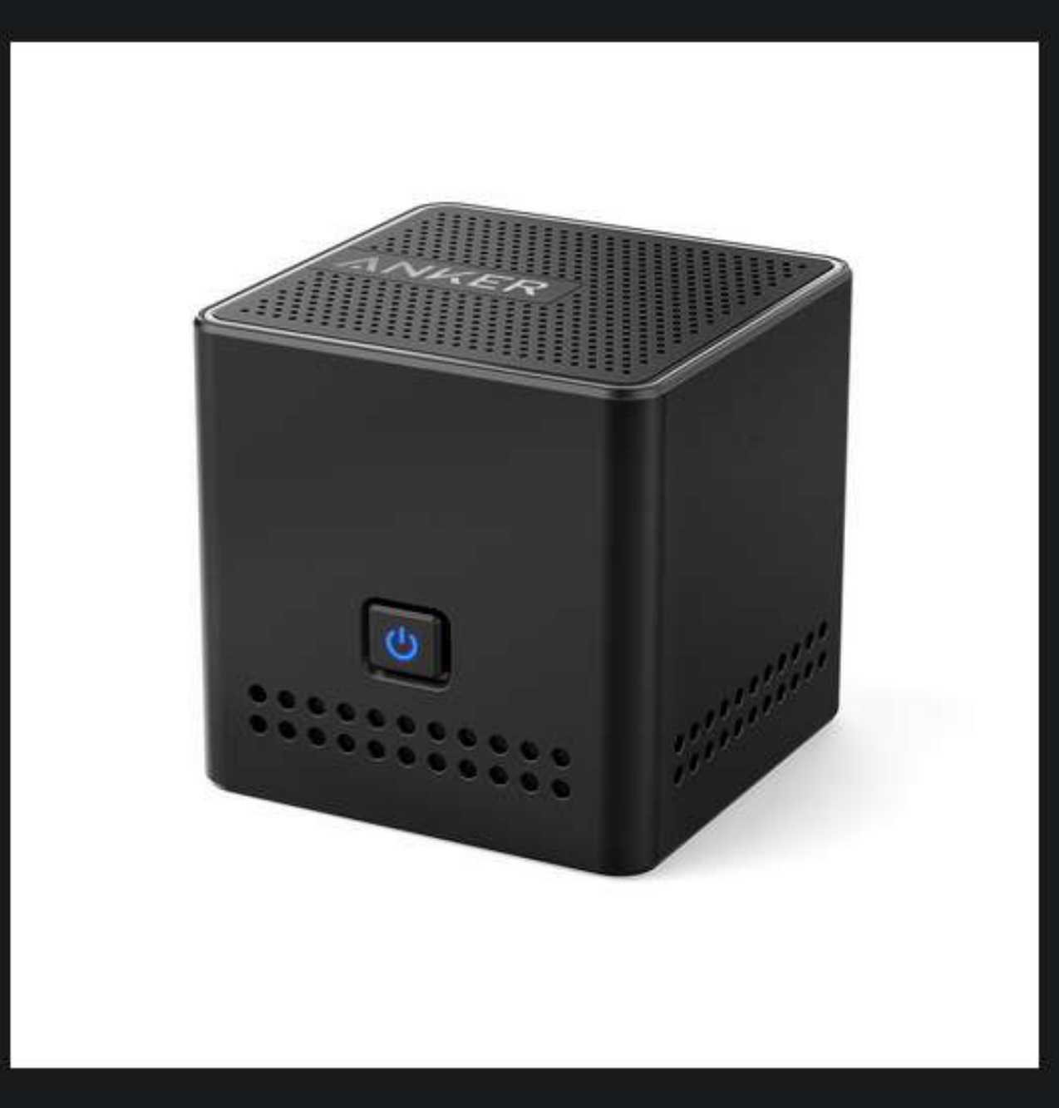
Demo Video

While this demonstration focuses on an extremely simple object, it covers a couple of very important topics - handling curves, and using subdivision to position elements within a given surface.

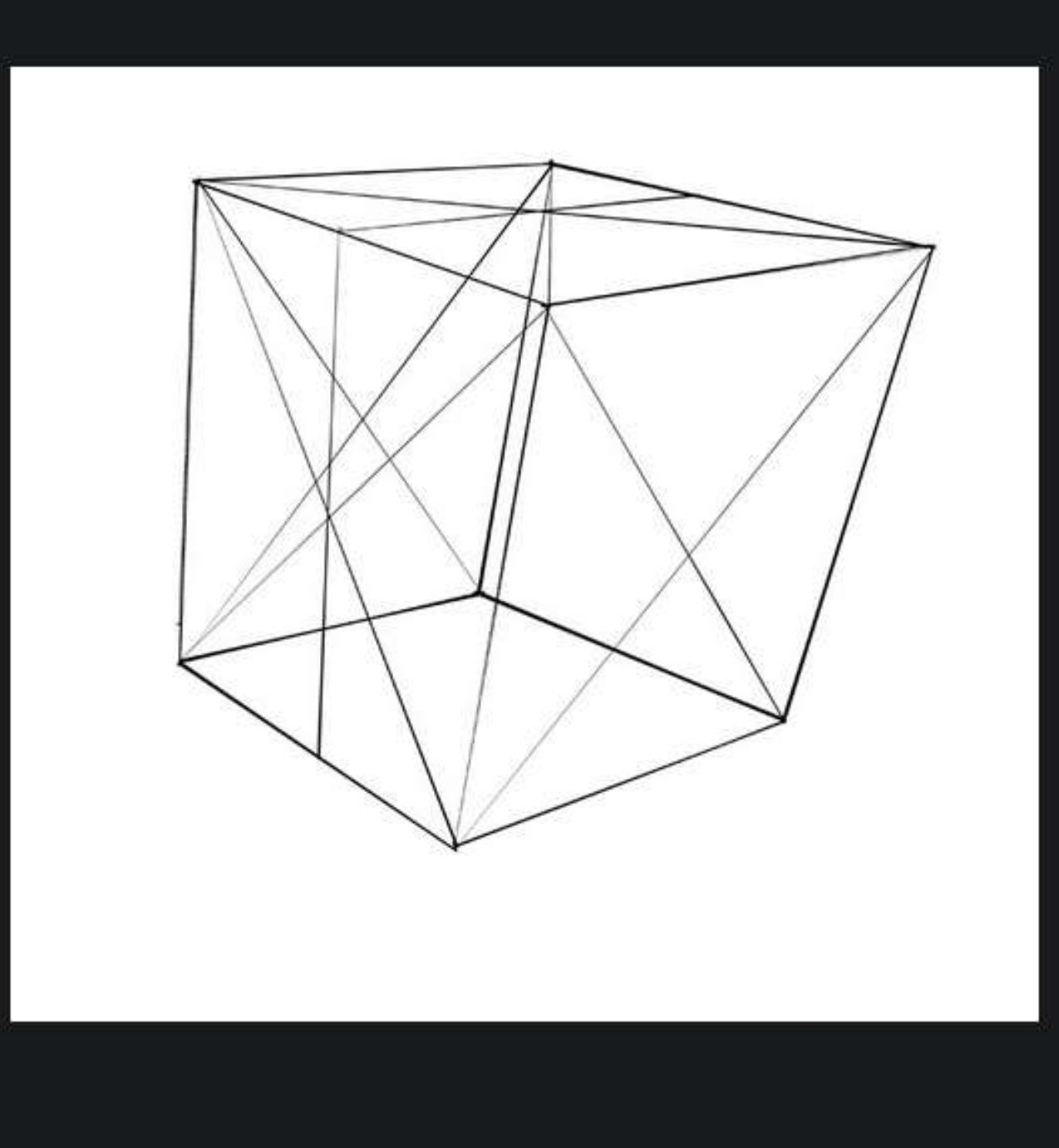
The demo video includes full audio and discussion of the concepts demonstrated in the drawing.

Reference



Here's our reference - it's a dead simple bluetooth speaker, and while it's got some interesting details (mostly in those circular holes littering all its surfaces), we're going to be ignoring them entirely.

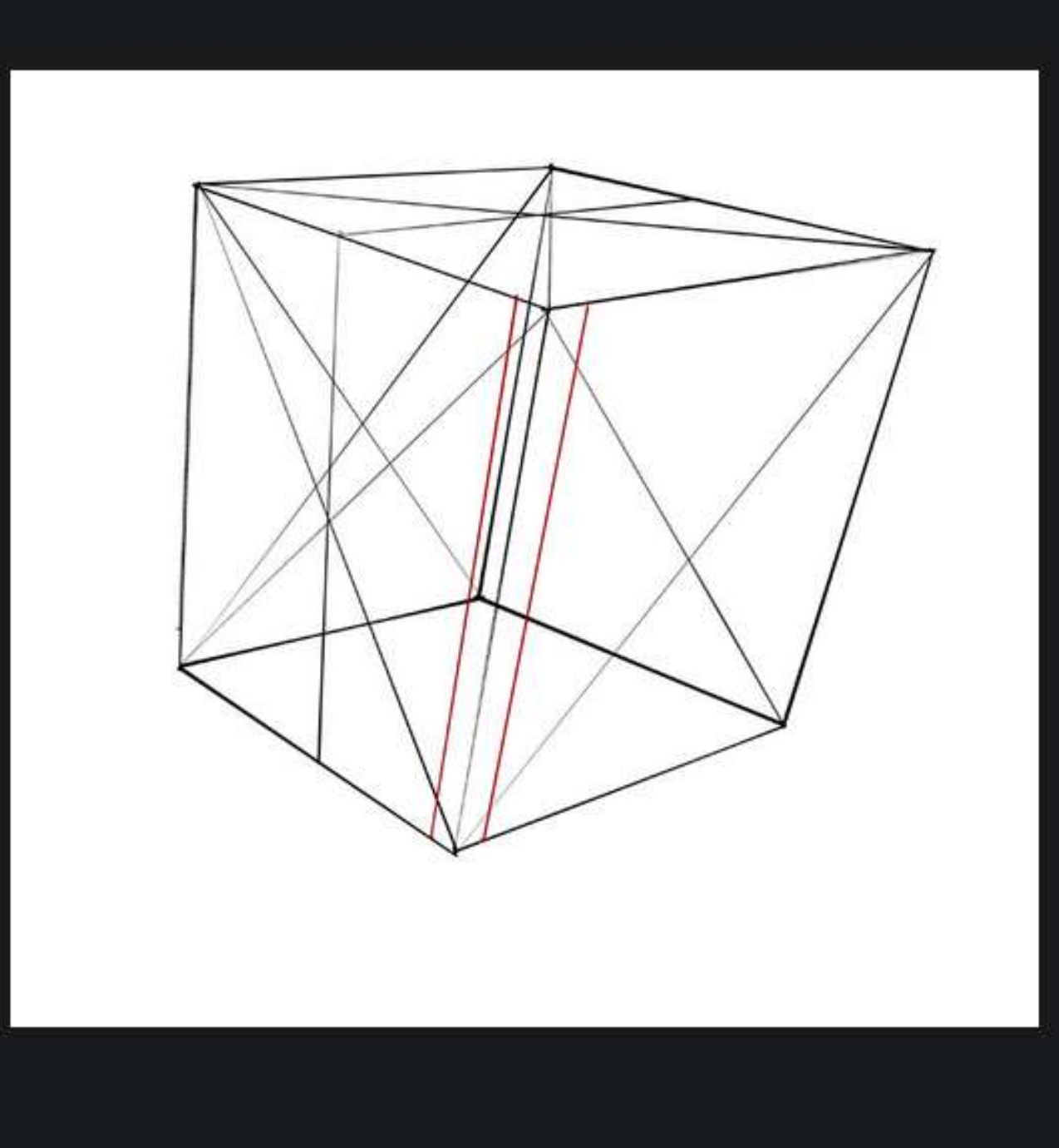
Step by step



As one might imagine, we're starting with a box. you'll notice immediately that the far right vertical line of this box is a bit dramatic. When this happens to you, you may think, "well damn, I'm going to start over on a fresh page". Don't.

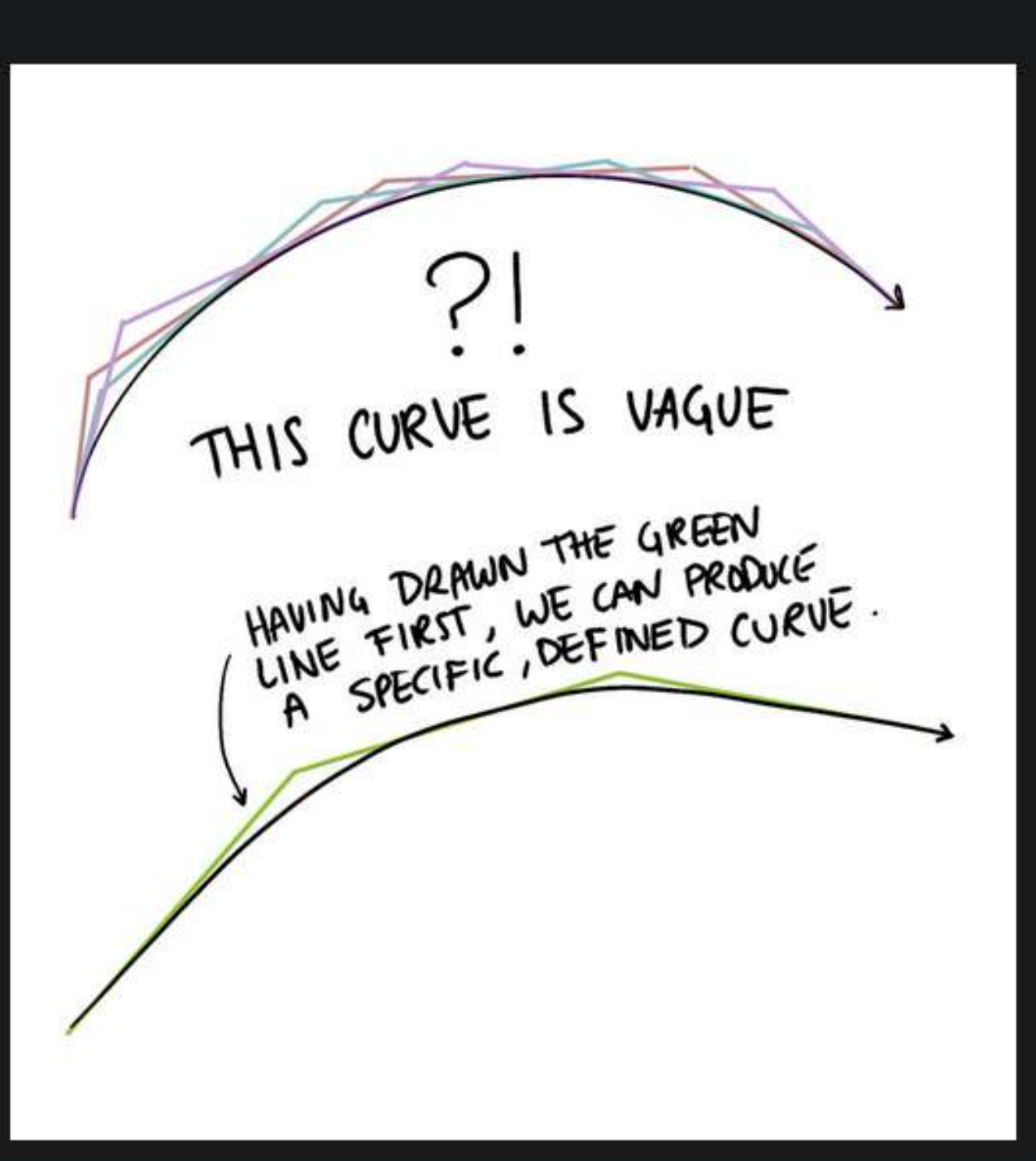
Mistakes happen, but there's a lot of value in seeing a construction through to the end regardless.

You'll also notice that I've drawn crosses on many of the planes of this box. If you're not sure of what I'm doing here, or if you haven't watched the advanced boxes video, go give it a look. It covers concepts involved with splitting a box into equal parts, which is integral to this lesson as a whole.



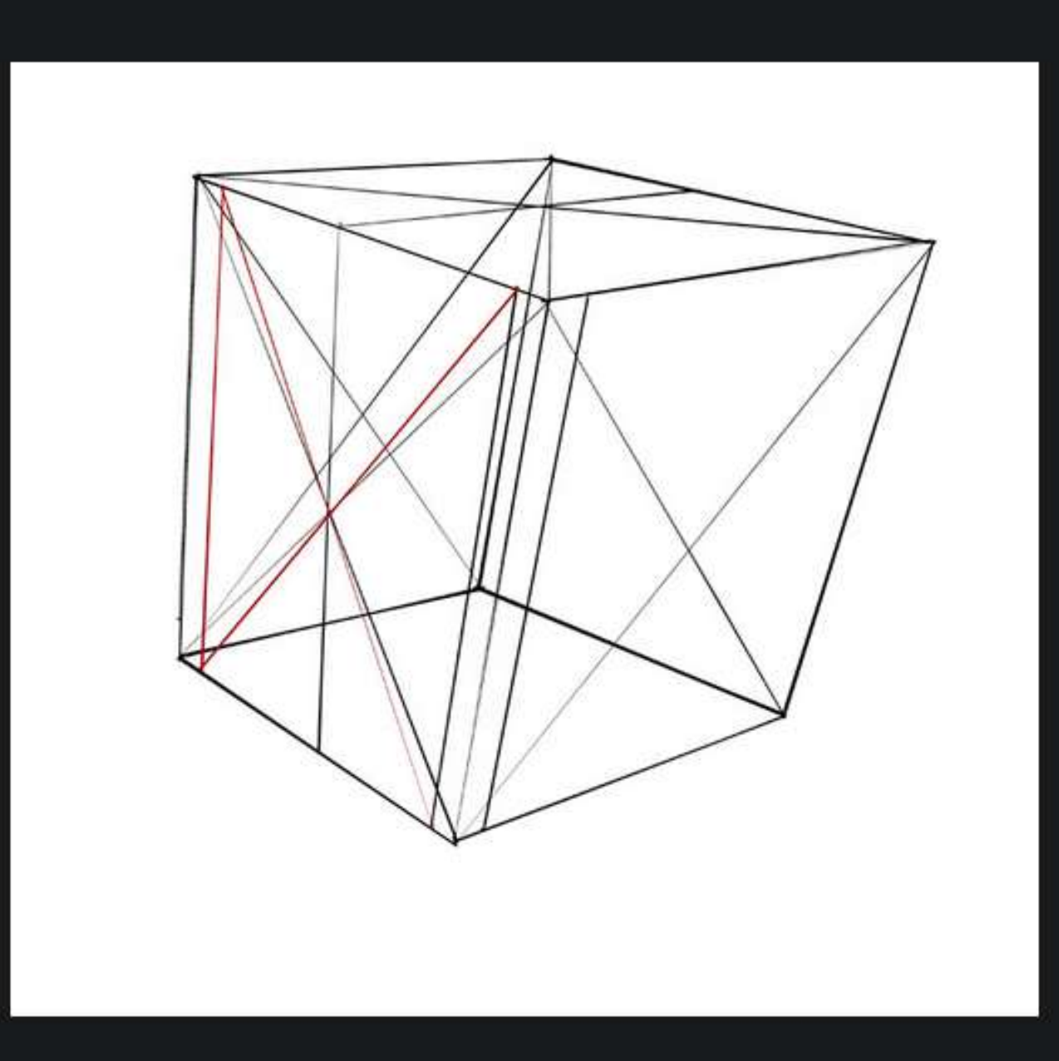
As you can see in the reference image, this speaker has very clearly curved (beveled) edges. It's often a bit tempting to just jump right in and curve them immediately, but I want you to fight that urge.

Instead, we're going to deal with straight edges and sharp corners as long as we can through this construction. The reason for this is that a curve is, by its very nature, *a vague answer*.

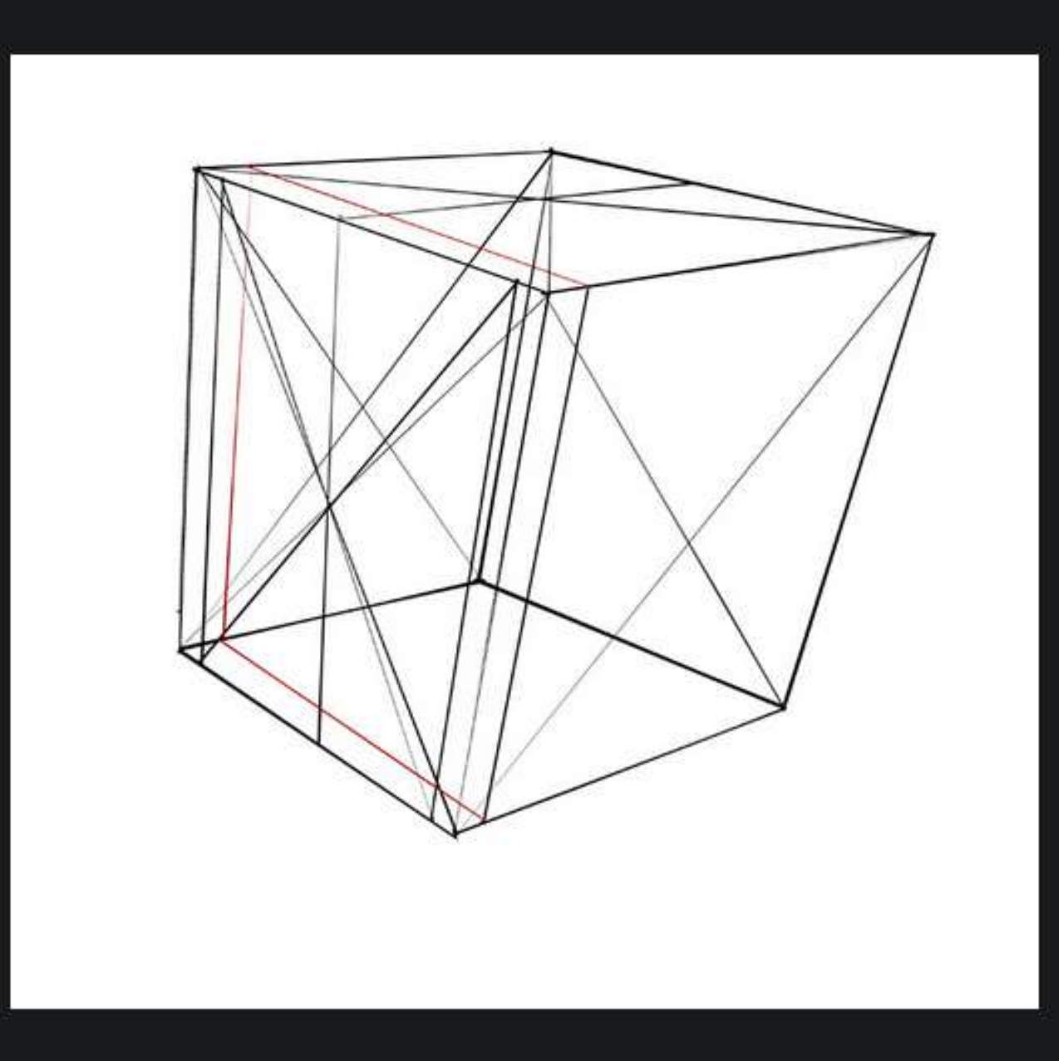

?!
THIS CURVE IS VAGUE
HAVING DRAWN THE GREEN LINE FIRST, WE CAN PRODUCE A SPECIFIC, DEFINED CURVE.

In previous lessons and demonstrations, I've explained the constructional method to consist of a series of questions being answered. We take a very complicated question, or problem, and we break it down into many smaller, manageable ones. We then, through drawing, answer each question or solve each problem, working our way up until eventually the whole complicated question is answered.

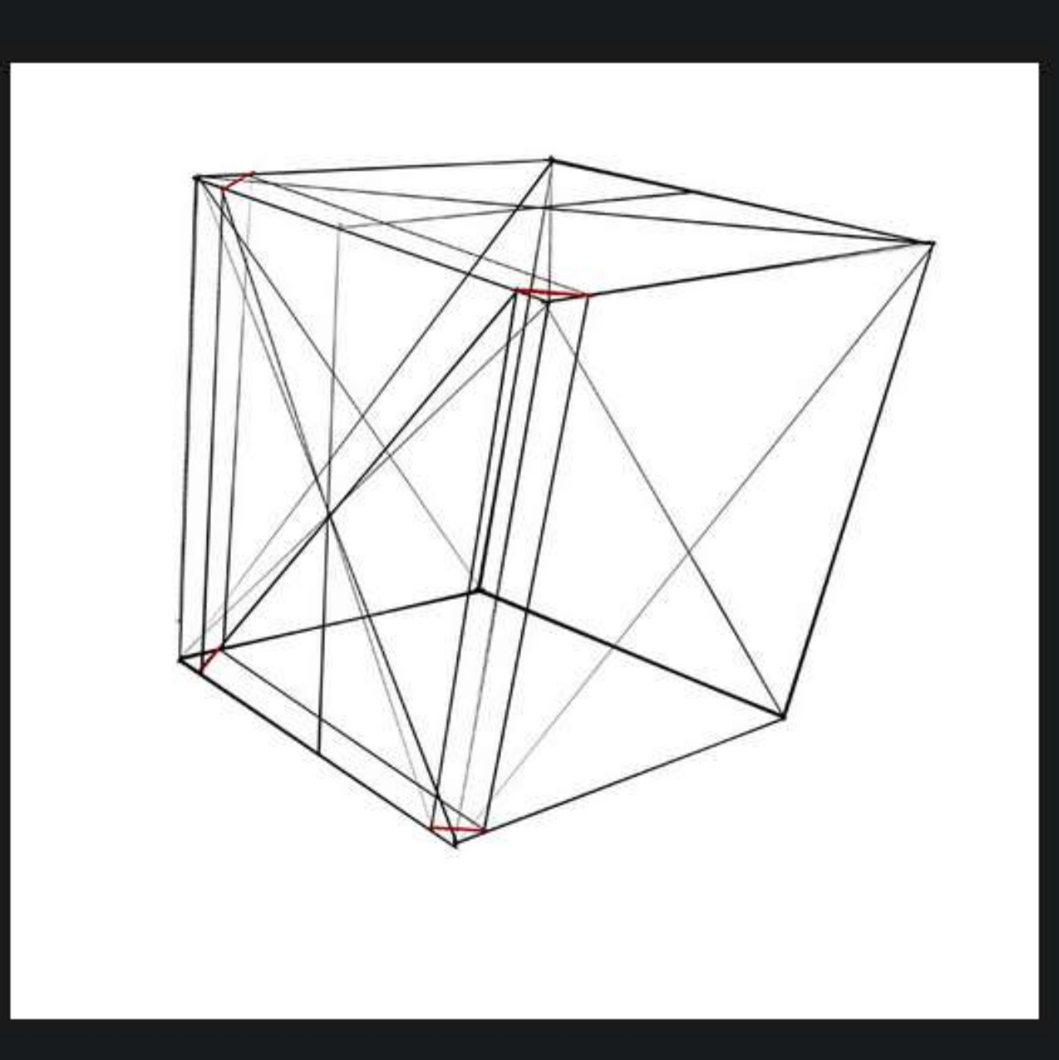
A curving line, if not following a clearly defined path, is by its nature a vague answer that can summarize or represent many different combinations of straight lines.



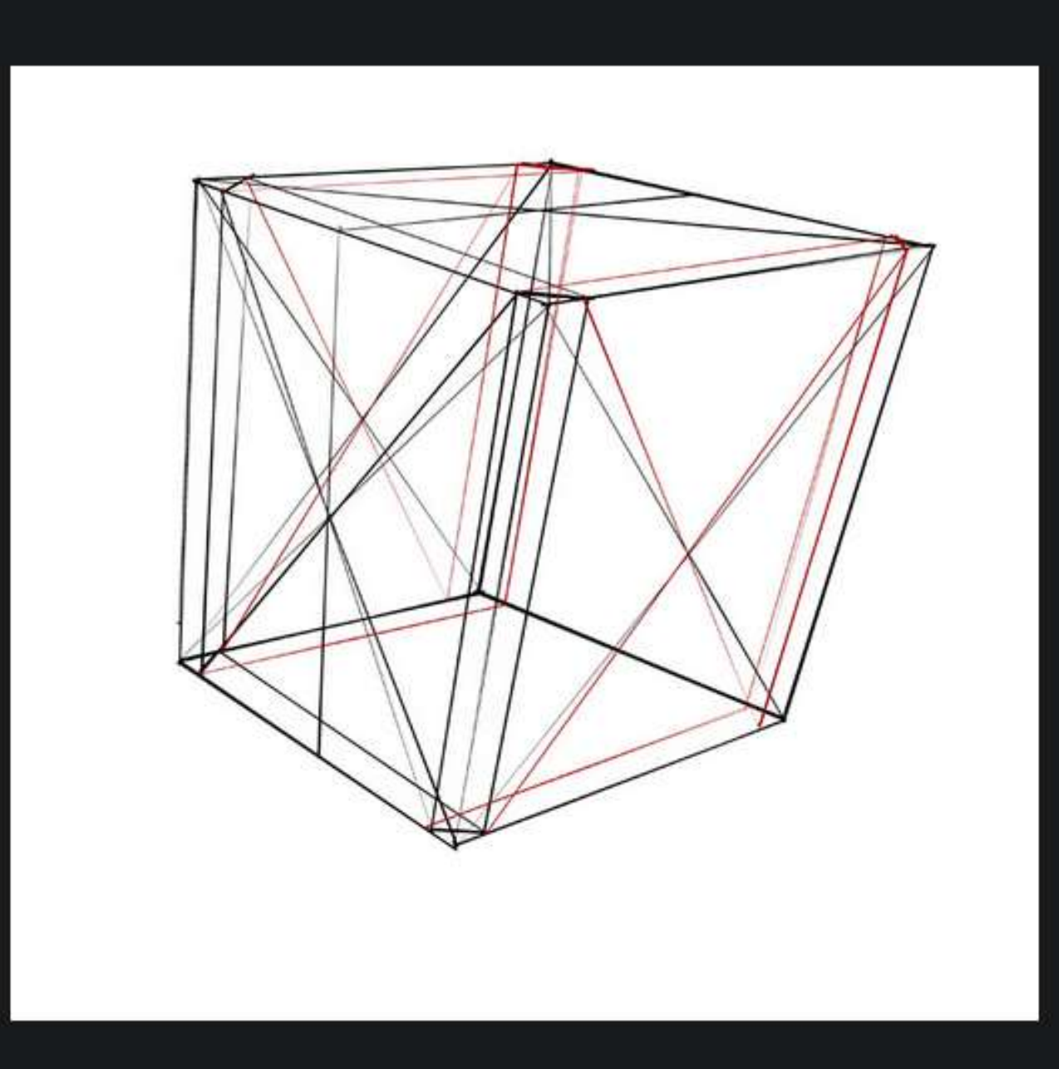
Applying the technique discussed in the intro video for this lesson, where we take a line on a plane and mirror it across the center of that plane, we can transfer one end of our cut corner to the opposite side. This can be used whenever you need to transfer such a detail to the other side of the plane it is on.



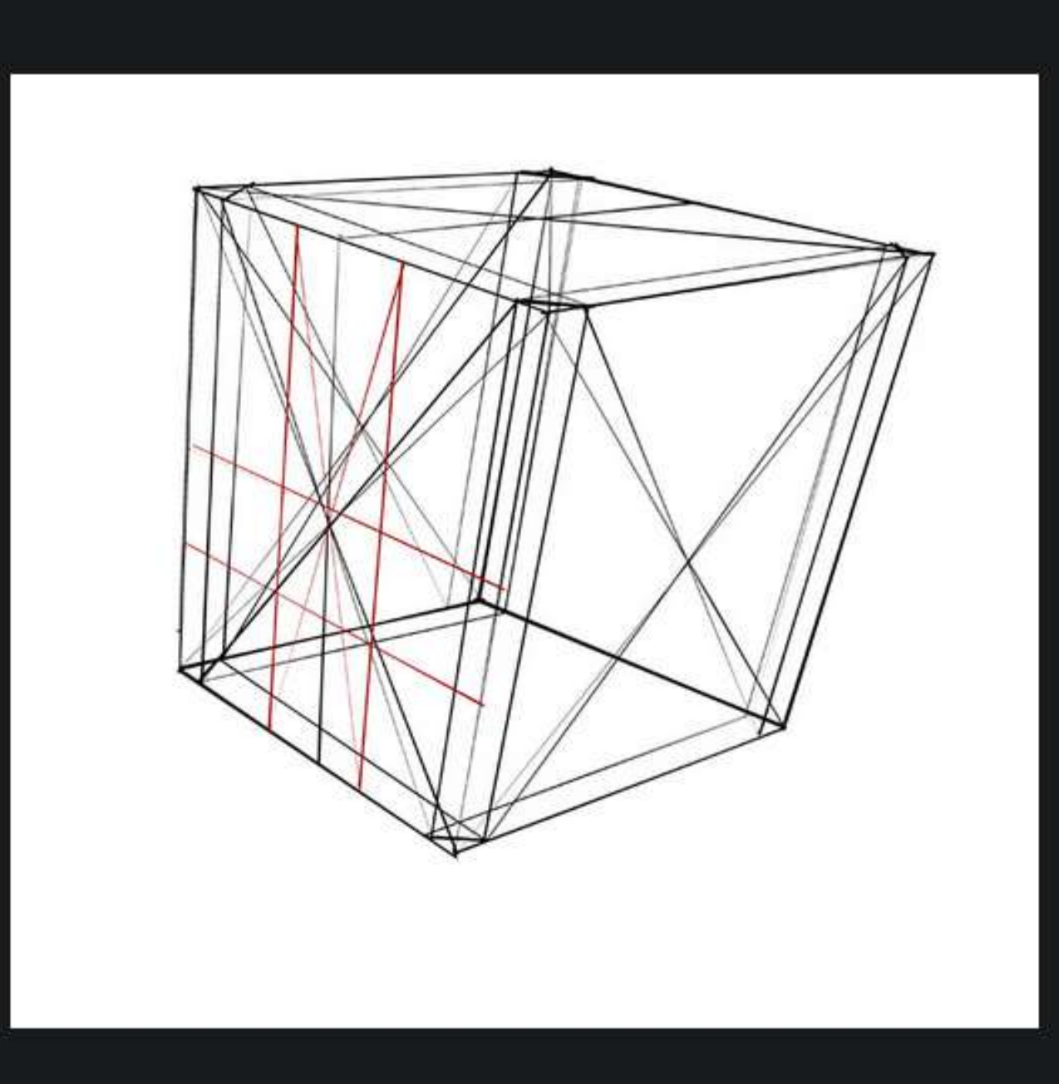
When you want to transfer it to a different plane, however - one that sits opposite it across the box, then we can draw a line across it, minding one of the box's original vanishing points to create a cross-sectional cut.



Once those edges are defined on either side, we can cut across them as shown in red here.

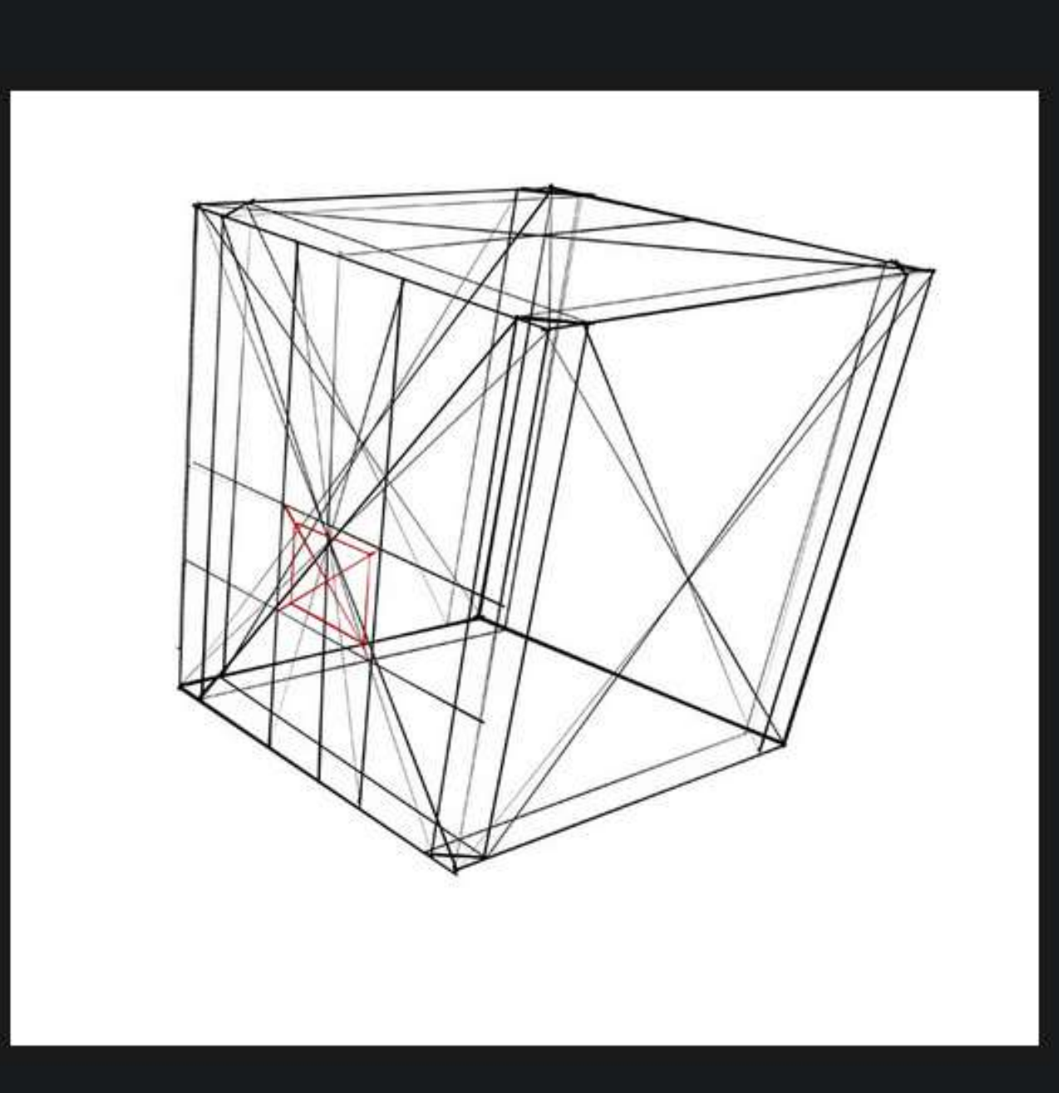


While this image looks a bit visually complicated, it's a repetition of the same process. We're using the mirroring technique in some cases, and creating cross-sectional slices in others, to transfer this cut corner to all the other corners of the box.

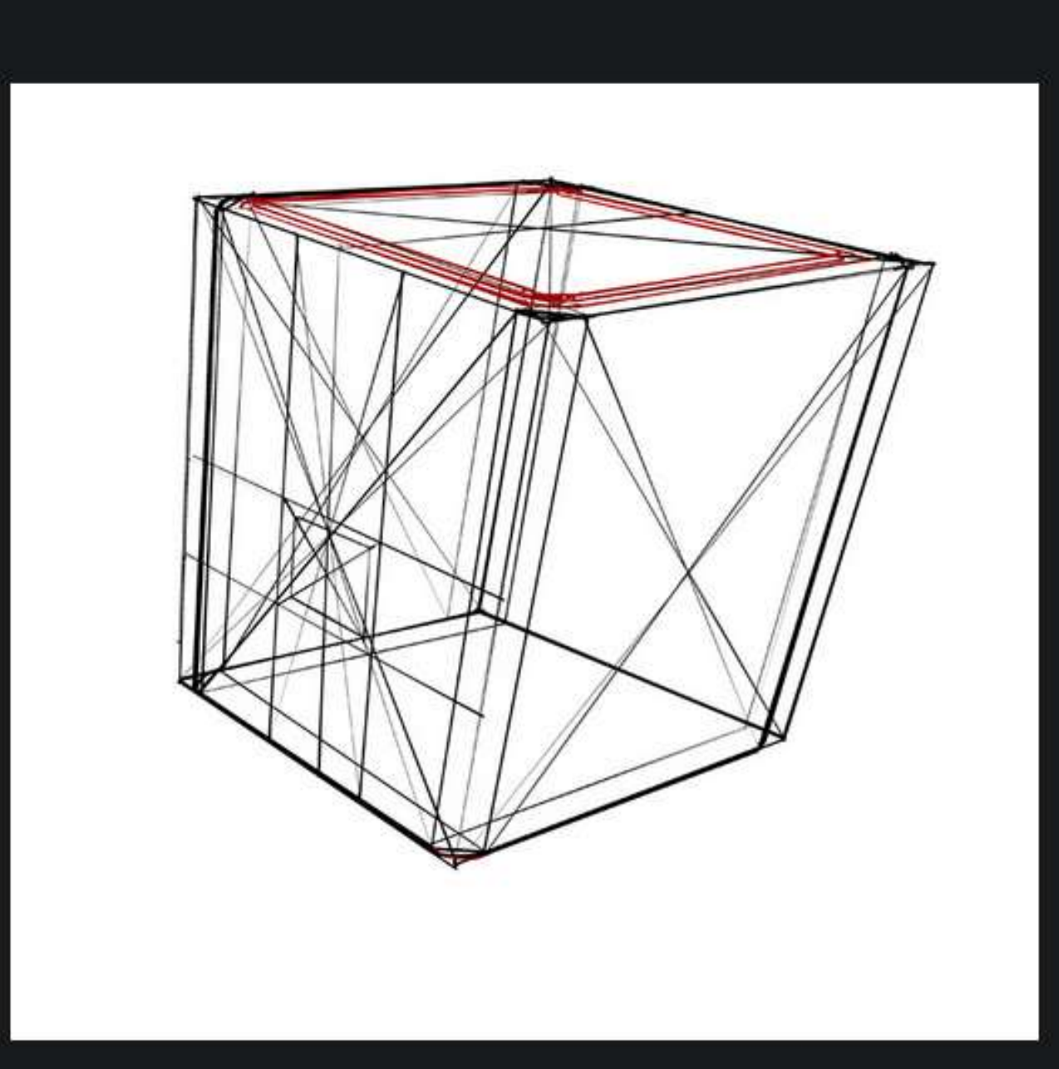


With our corners cut, we still have a bit more construction to do here - positioning the big button. I've mostly used a combination of approximation and mirroring the vertical lines across the center of that front plane to create a squarish cut, centered horizontally and set towards the bottom half of the box as observed in my reference image.

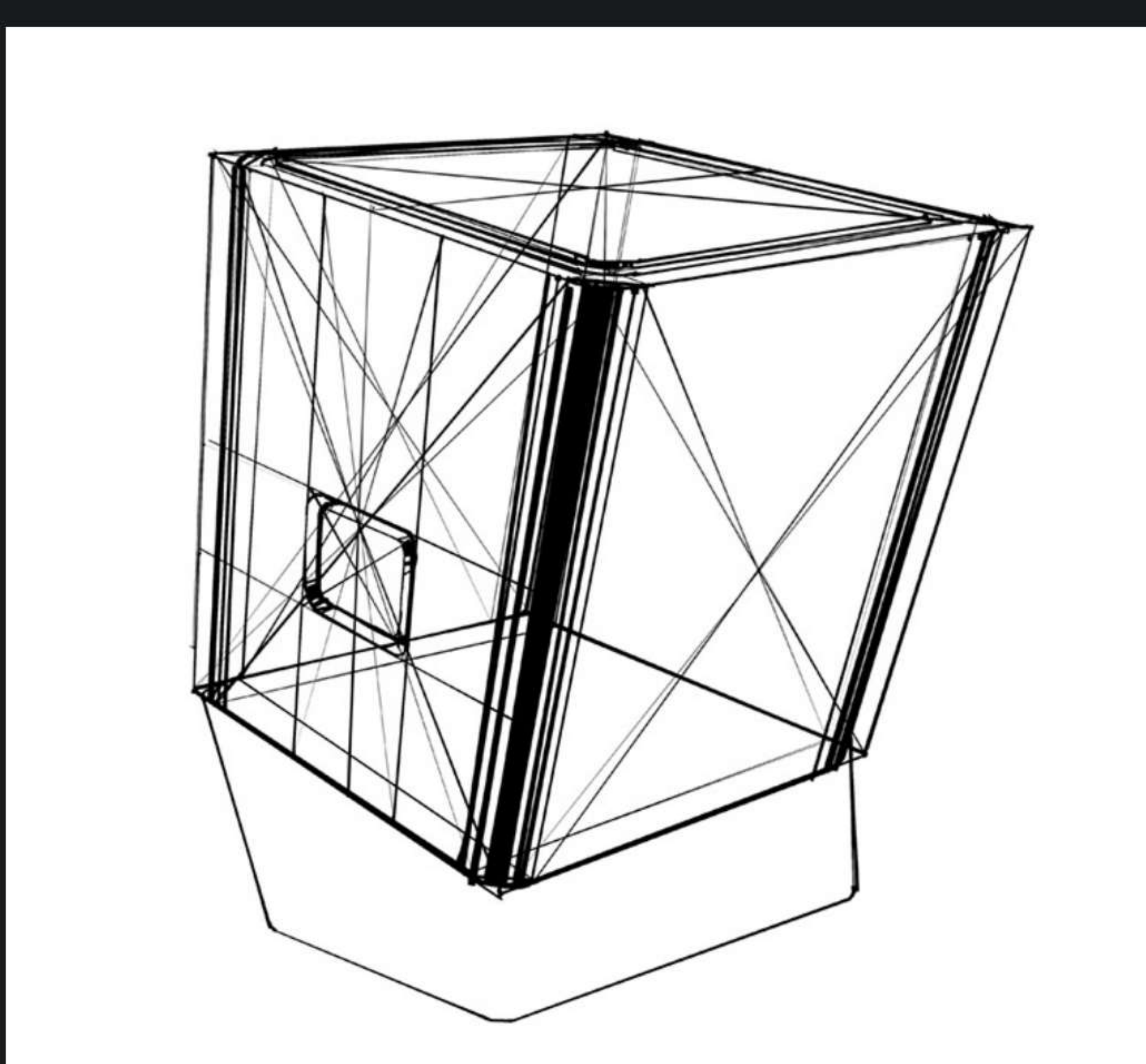
I was eyeballing that position, though upon further inspection after the fact, I found that the top edge of the button sat flush with the vertical center of the box. My estimation came *pretty* close, but I could definitely have been more conscientious about that.



I've created a bit of an inset here, by drawing my usual diagonals from corner to corner, and picking a position along one of those diagonals. I then draw lines around it, keeping parallel to the outer edges of the plane.



The last major step is just to apply the same principle of inset lines to create the concentric lines along the top face of the speaker. I've also rounded out the corners that we cut initially, sticking closely to the straight lines.



And the rest, as always, is a matter of line weight. You'll also see that I've made some pretty prominent choices on how to convey the roundedness of that corner. I've applied here a technique you may also see on cylinders as well, where the roundedness of that surface is conveyed with straight lines going up and down the length of the tube, rather than contour lines circling around it. I find this to be much more effective, and you can achieve a sort of transition from really thick ones towards the middle of my "shading", gradually getting thinner towards the outside. It also replicates an effect one might see on more polished metal.

I've also added the outline of a basic cast shadow. More often than not I'll avoid filling these in, as I don't want to draw attention away from the object itself. A simple outline of a basic approximation of the form is usually enough to make the object feel grounded, as though it's resting on a table or something, rather than floating in space.

<<< Overview

Wooden Barrel Demo >>>

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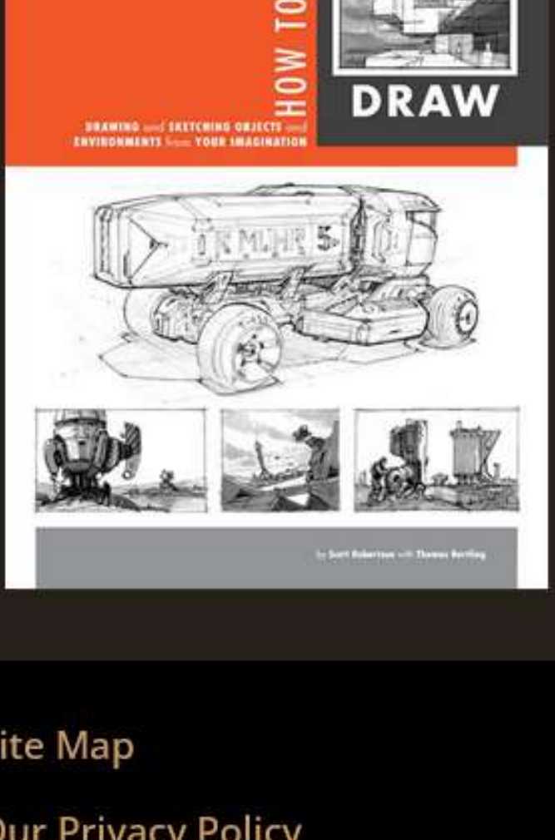
How to Draw by Scott Robertson

When it comes to technical drawing, there's no one better than Scott Robertson. I regularly use this book as a reference when eyeballing my perspective just won't cut it anymore. Need to figure out exactly how to rotate an object in 3D space? How to project a shape in perspective? Look no further.



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Lesson 6: Applying Construction to Everyday Objects

Wooden Barrel Demo

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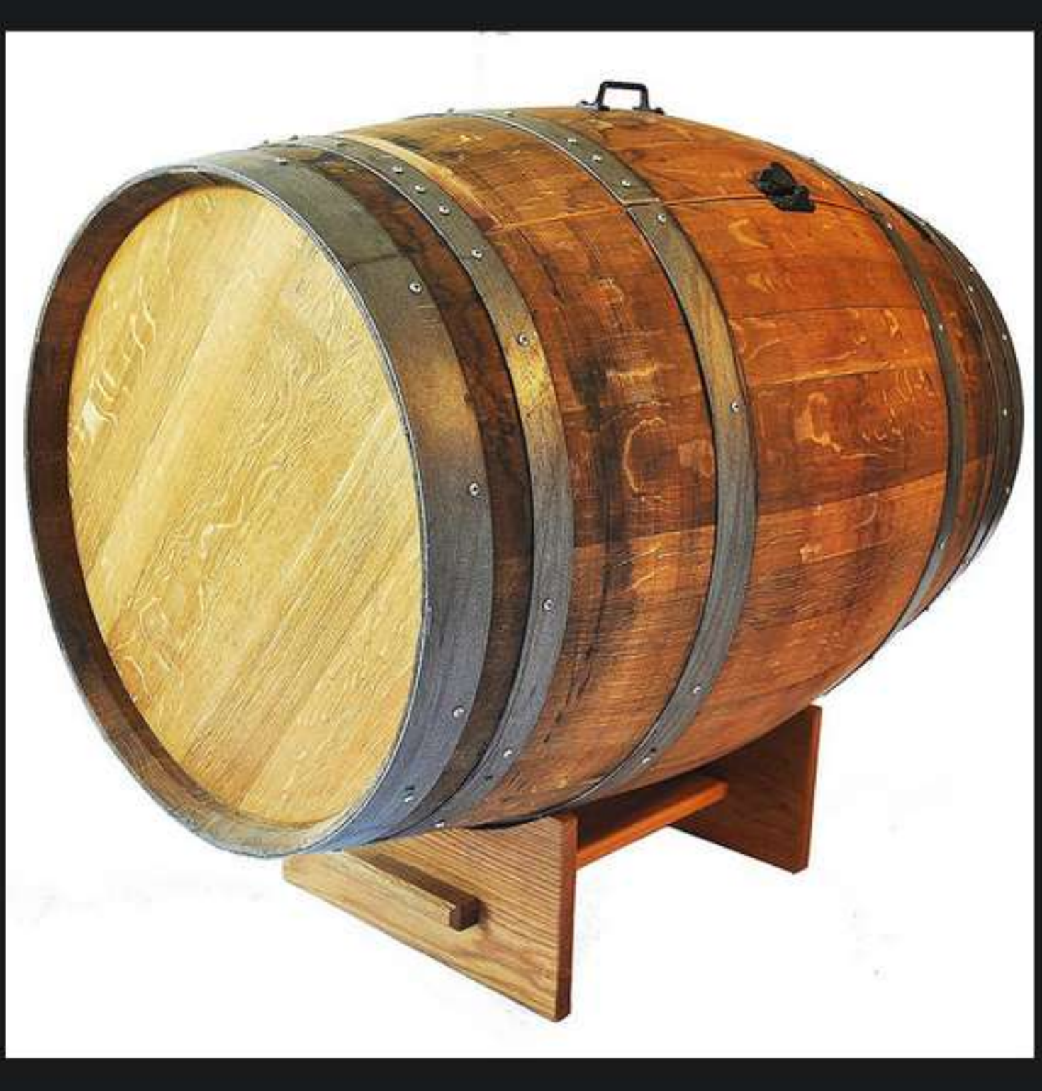
Demo Video

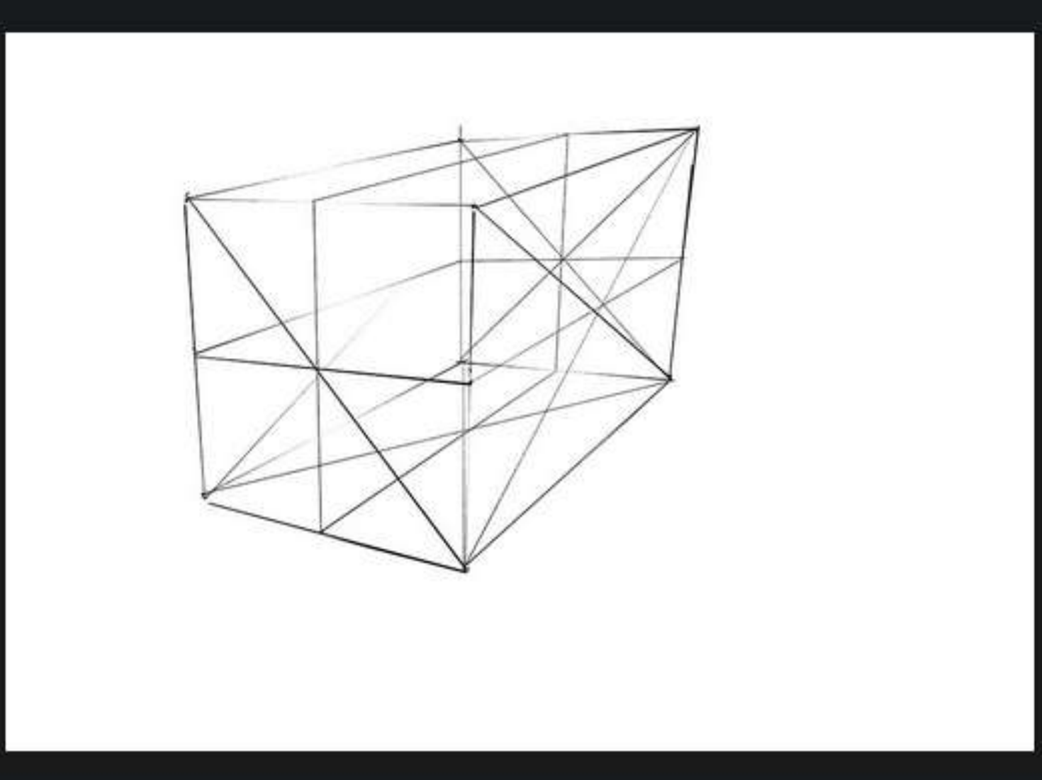
The one thing I know all of you have in your house - ye olde barrel. I wanted to find something with lots of ellipses, and instantly hated myself for it. Ellipses are the worst.

This recording has no accompanying audio commentary.



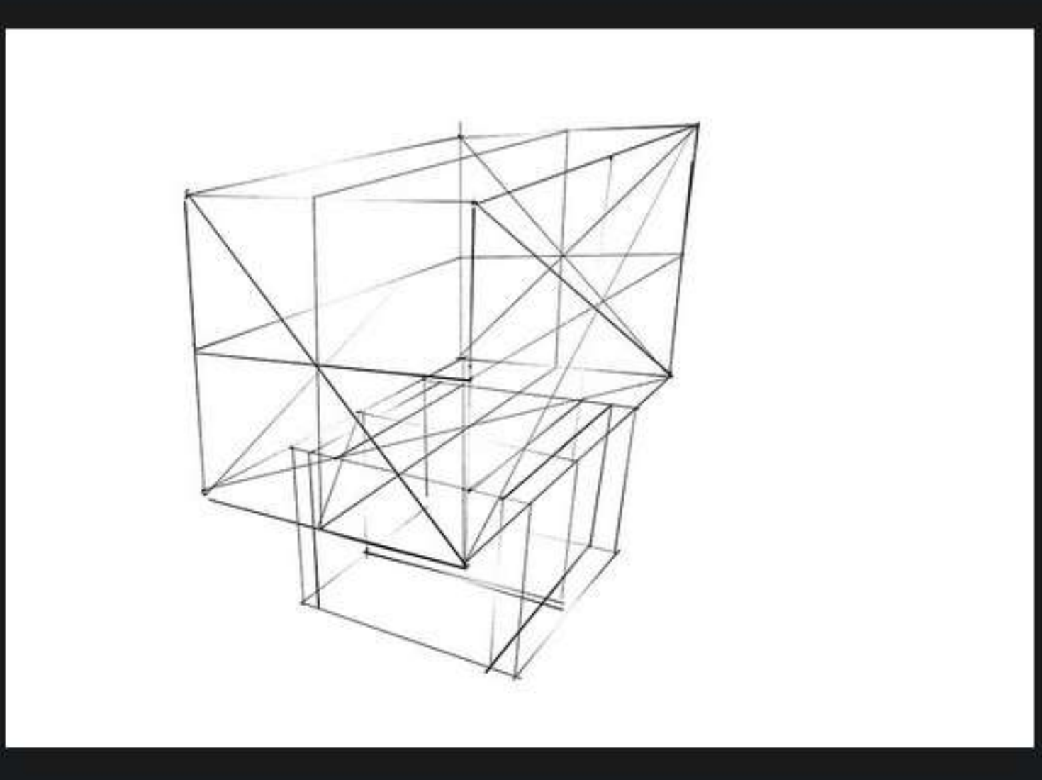
Reference

Here's a the image we're going to be working from.

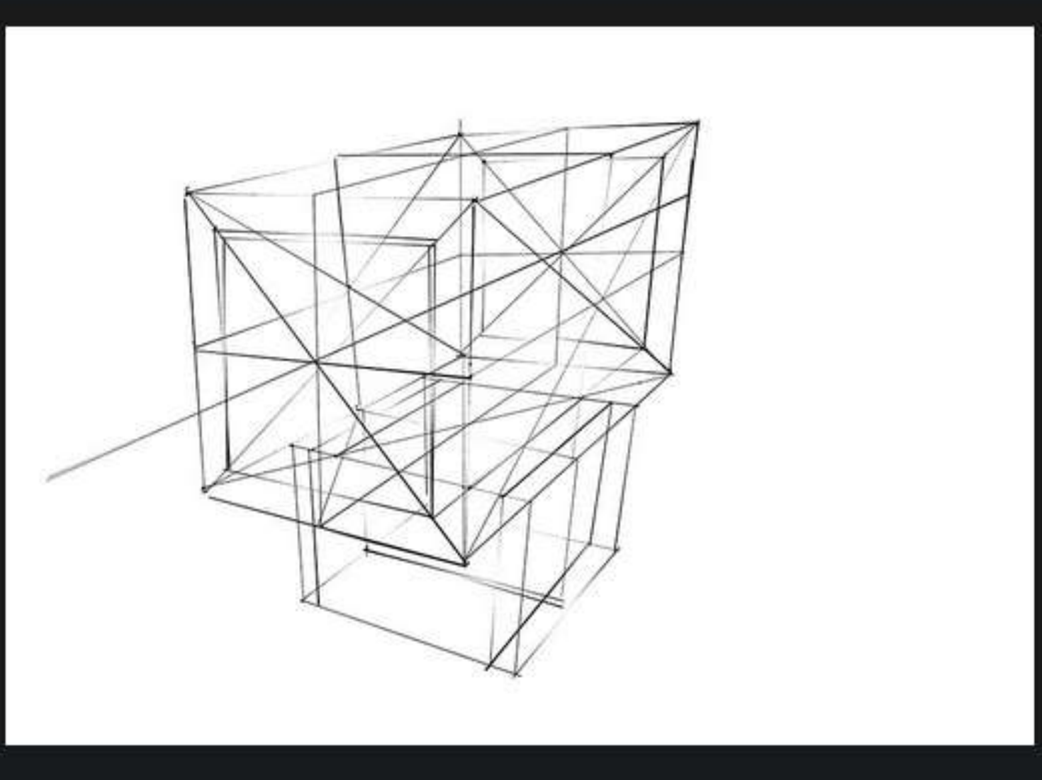


Step by step

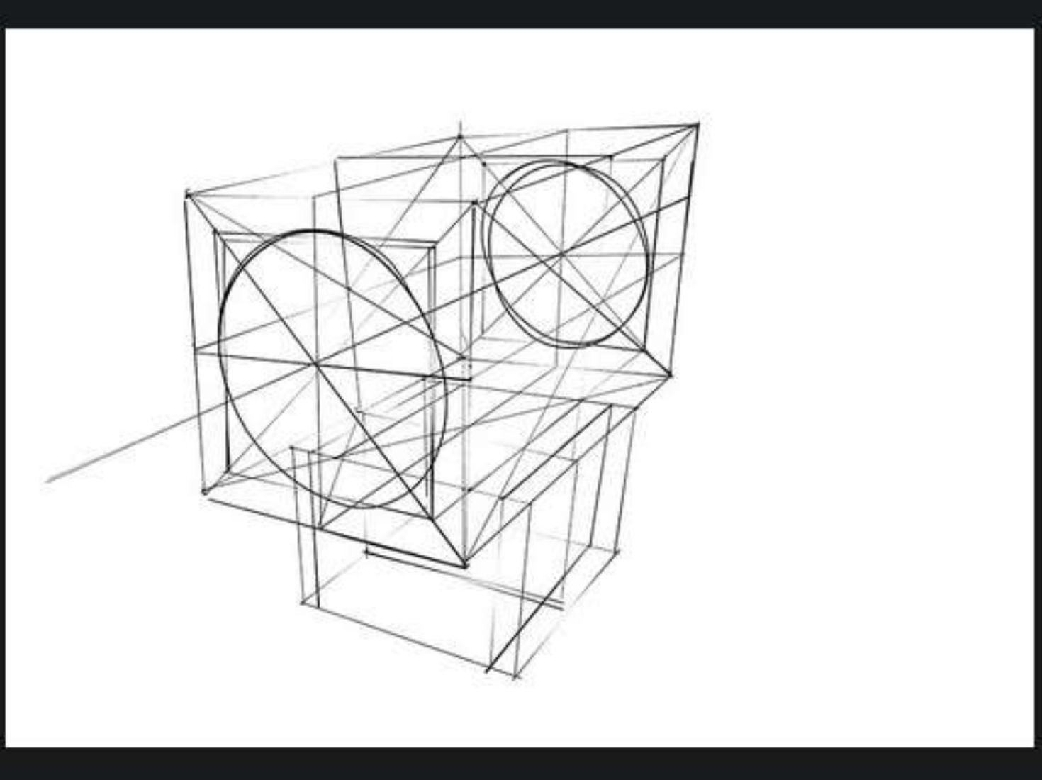
Goodness, we draw so many boxes here, we should practically name the website drawa- oh wait. I subdivided the crap out of this one, knowing that it's blocking in my barrel. Finding the center point of the two opposite sides of this box will let me find my minor axis, and generally subdividing my form will also make it easier to align other forms to it.



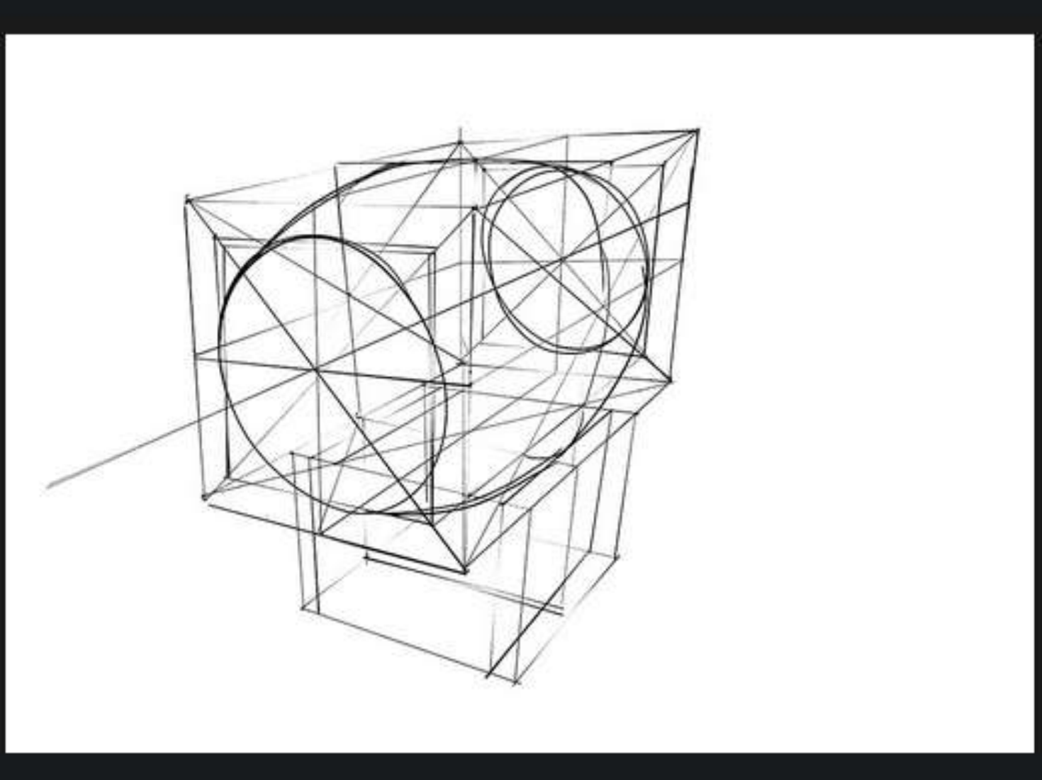
This looks like a bit of a jump, but just compare this step and the previous one - I've done a few things. I've added the box underneath, which is just as wide as the initial box, and I've cut into it. I did so by drawing a line on the closer side to mark how far in I wanted to cut, then I mirrored this line across the box's center to find the equal cut on the opposite side. I explain this in the intro video, specifically at the end of the part about how to subdivide your forms.



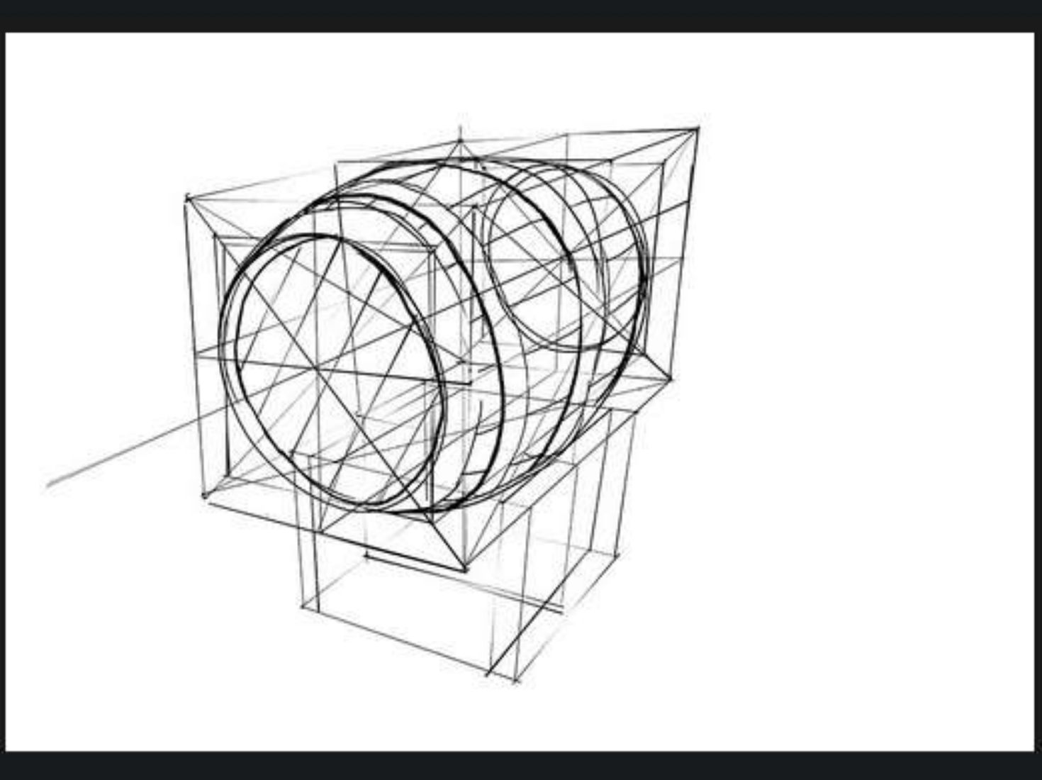
If you look at the barrel in our reference, it's not a perfect cylinder. In the center, it's wider than at the ends. To start, I'm encapsulating the barrel inside of a simple box form, which itself is a much simpler form to knock out initially. I want to make sure that my barrel remains snug within the box itself, and so I cut an inset into both sides of the box (again, I discuss this in the intro video, during the speaker demo). I could technically expand the midsection of the barrel out, but I feel that this would be much more difficult to achieve without messing up my proportions. The encapsulating box approach instead allows me to set out how much space I'm going to be using for a given form. Doesn't always work out that way, but it's usually close enough to be a useful block-in tool.



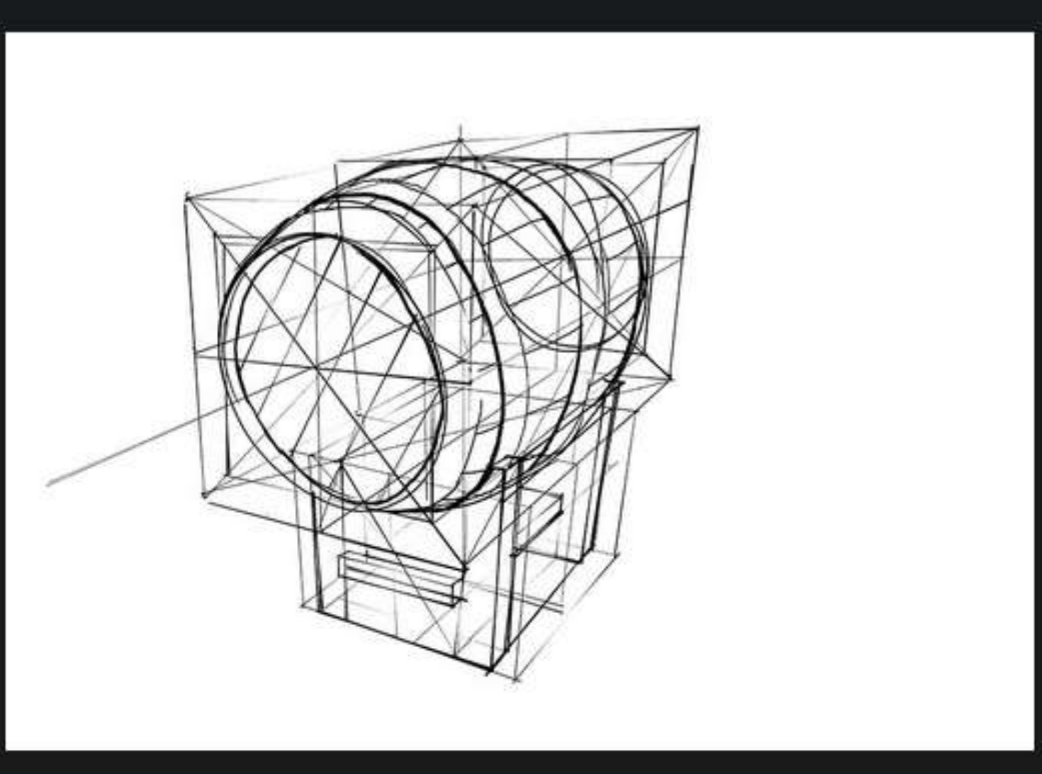
Ghost a LOT. Also, do some practice runs off to the side. Ellipses are tricky as hell, and there's a lot of things you need to try to achieve (aligning to your minor axis, fitting within the alotted space, getting your contact points with the top and bottom of the enclosing plane to line up, and so on). It won't come out perfect, because you're not a machine. A lot of artists use ellipse guides for this sort of thing, so you don't have to feel compelled to nail this. Hell, if you HAVE an ellipse guide, go ahead and use it. Either way, do the best that you can.



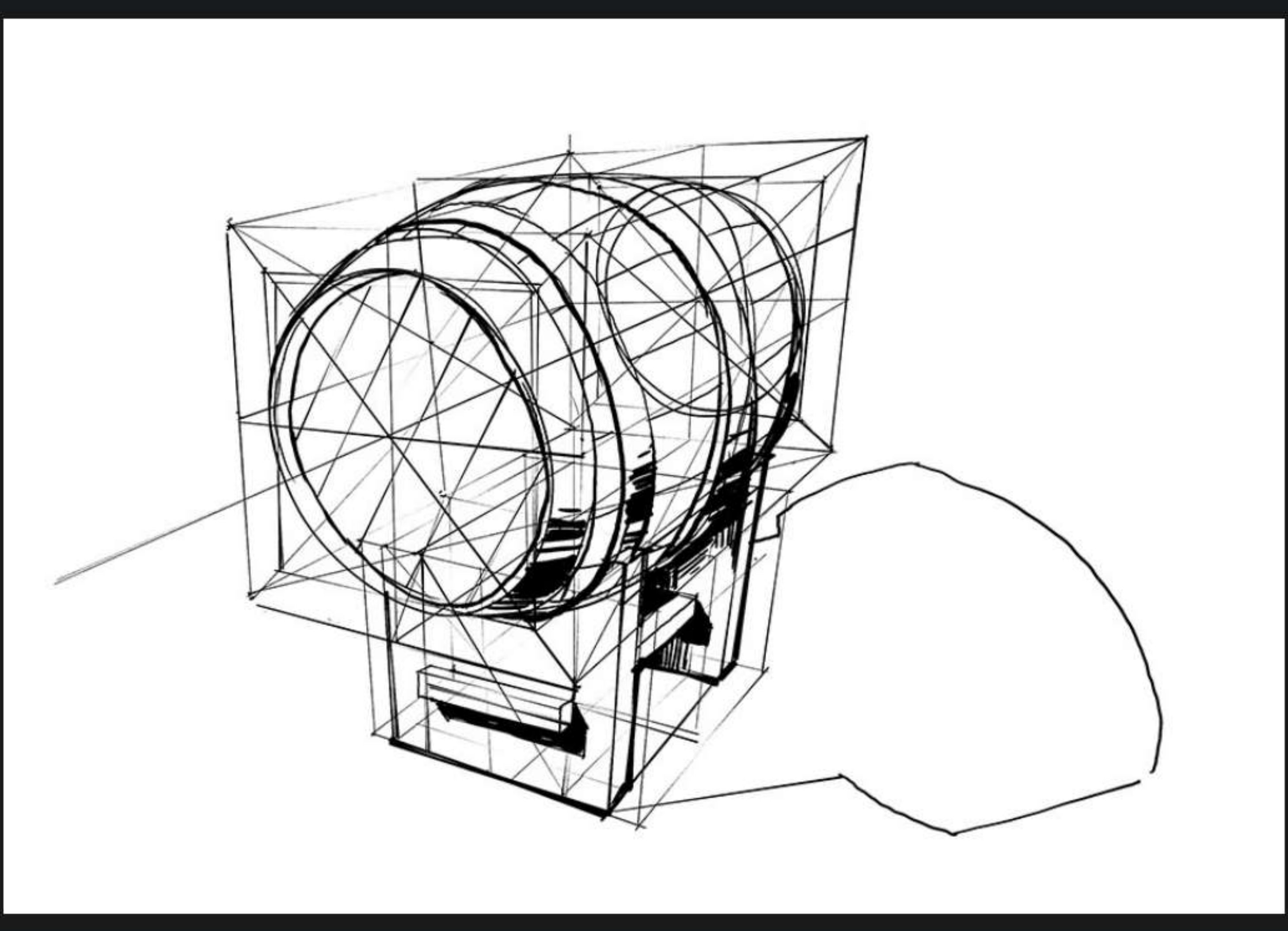
This one's also challenging, so take your time and think through the problem. I need the barrel to smoothly swell out to its midsection, then come back down to the far end. I could have constructed another ellipse in the center, but I decided to wing it somewhat, trying instead to visualize that ellipse.



Detail's something I usually leave for the end, but I was honestly so drained by this barrel's stupid ellipses that I just wanted to get it out of the way. Boxes are easy, but ellipses can really be a nightmare. The iron bands that wrap around the barrel are really just contour curves. Still, maintaining the thickness between them was a little tricky at times. Always remember that this stuff is hard, and no one's expecting perfection. The final drawing does not matter, it's all about what you learn from the construction of the object. Each one of these drawings really pushes you to flex your brain, thinking through spatial problems and understanding how every form relates to its neighbours. Mistakes don't take away from that.



Back to the wonderful world of boxes. This was really just a matter of observing my reference, subdividing my boxes, extending some of the resulting lines, mirroring details across center lines, and so on. All the sort of stuff I explained during the intro video.



With these everyday objects, I really don't care much at all about texture and detail and whatnot. I've had students in the past submit work that was purely focused on construction, and it was a pleasure to leaf through. There certainly is texture here, but it's not worth worrying about. Focus on the construction, make sure your hierarchy of line weight is clear so the drawing stands out from all the construction lines, ground your object with a cast shadow (doesn't have to be accurate), and push some deep blacks here and there to make any important sections pop out.

<<< Bluetooth Speaker Demo

Computer Mouse Demo >>>

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Cottonwood Arts Sketchbooks

These are my favourite sketchbooks, hands down. Move aside Moleskine, you overpriced gimmick. These sketchbooks are made by entertainment industry professionals down in Los Angeles, with concept artists in mind. They have a wide variety of sketchbooks, such as toned sketchbooks that let you work both towards light and towards dark values, as well as books where every second sheet is a semitransparent vellum.

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- Demo Video
- Reference
- Step by step

Wooden Barrel Demo
- Demo Video
- Reference
- Step by step

Computer Mouse Demo
- Demo Video
- Step by step

Lesson 6: Applying Construction to Everyday Objects

Computer Mouse Demo

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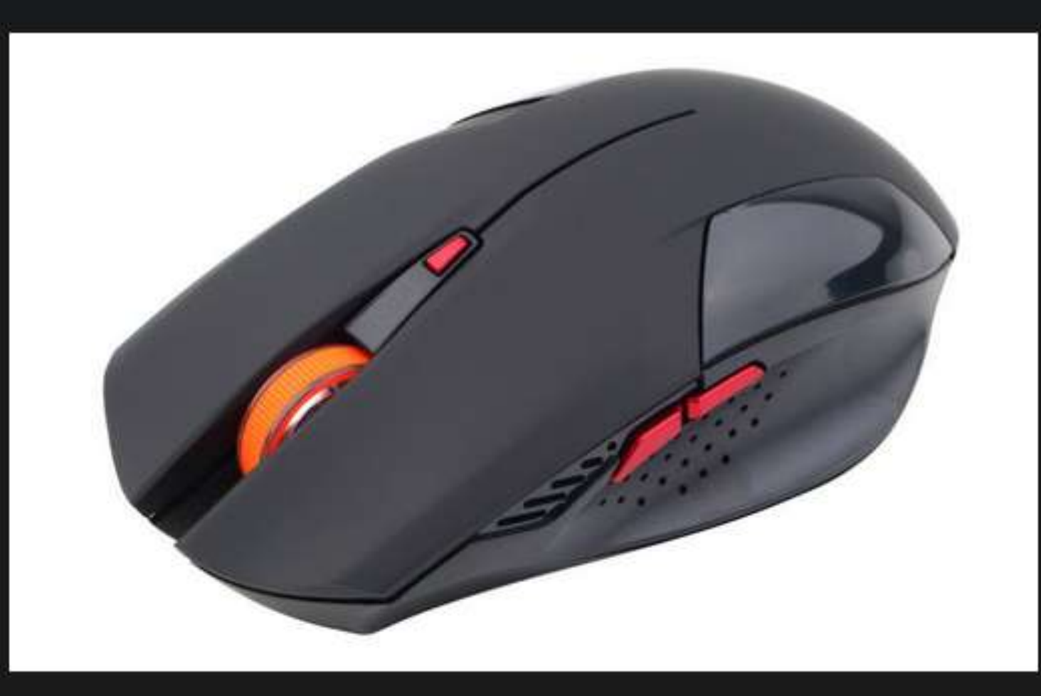
Demo Video

This is something more than a few people have struggled with, and for good reason. Computer mice combine both hard surface qualities with smooth, organic curves, and can be very challenging to construct with the standard geometric means.

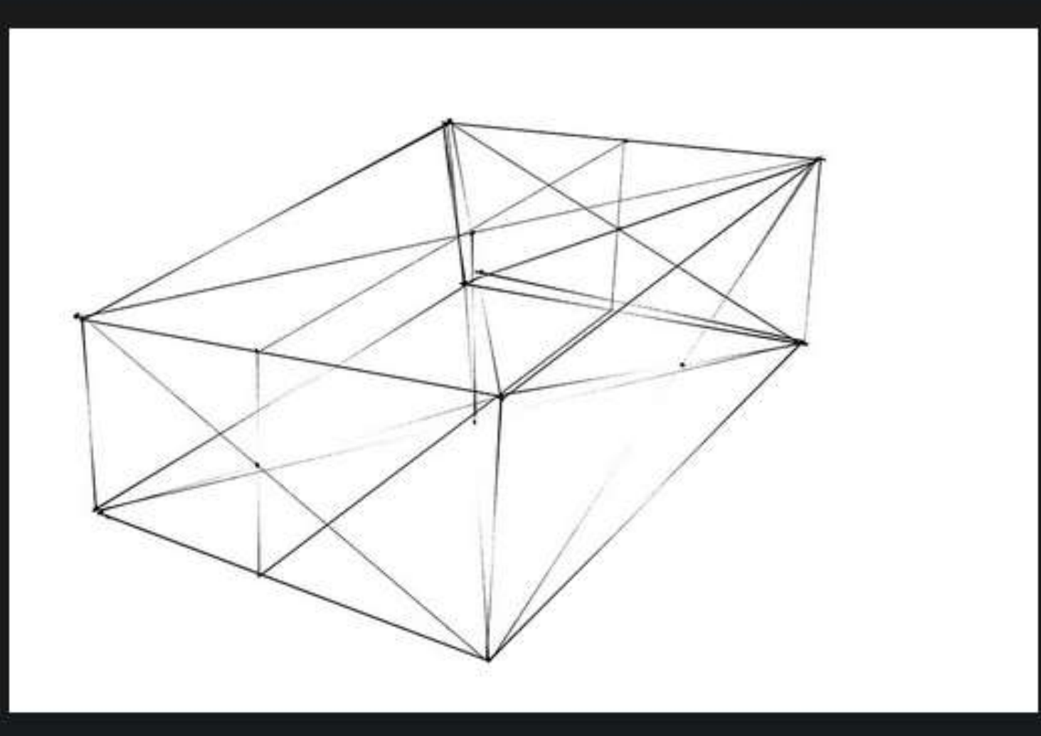
This recording has no accompanying audio commentary.

Reference

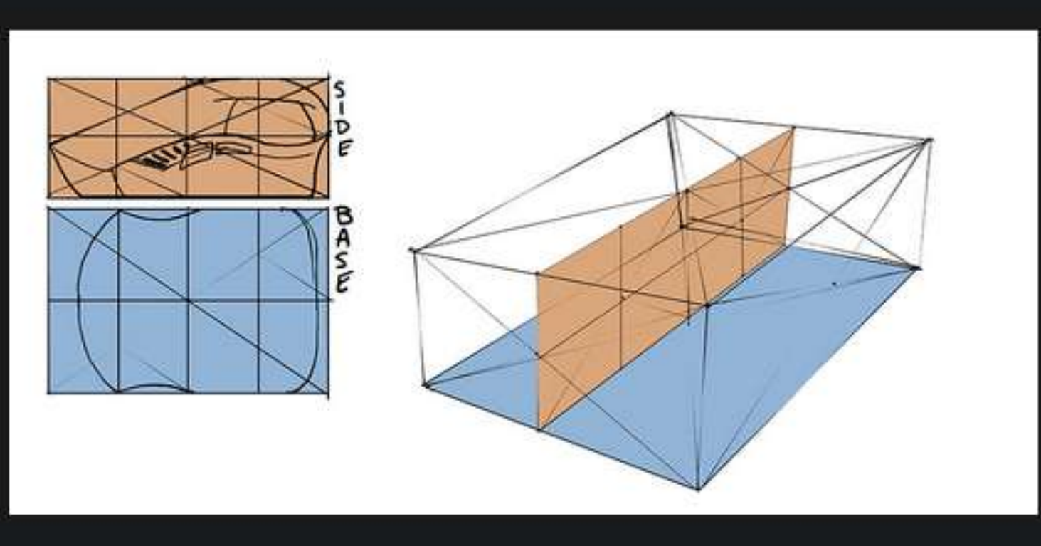


Here's the image we'll be working from.

Step by step

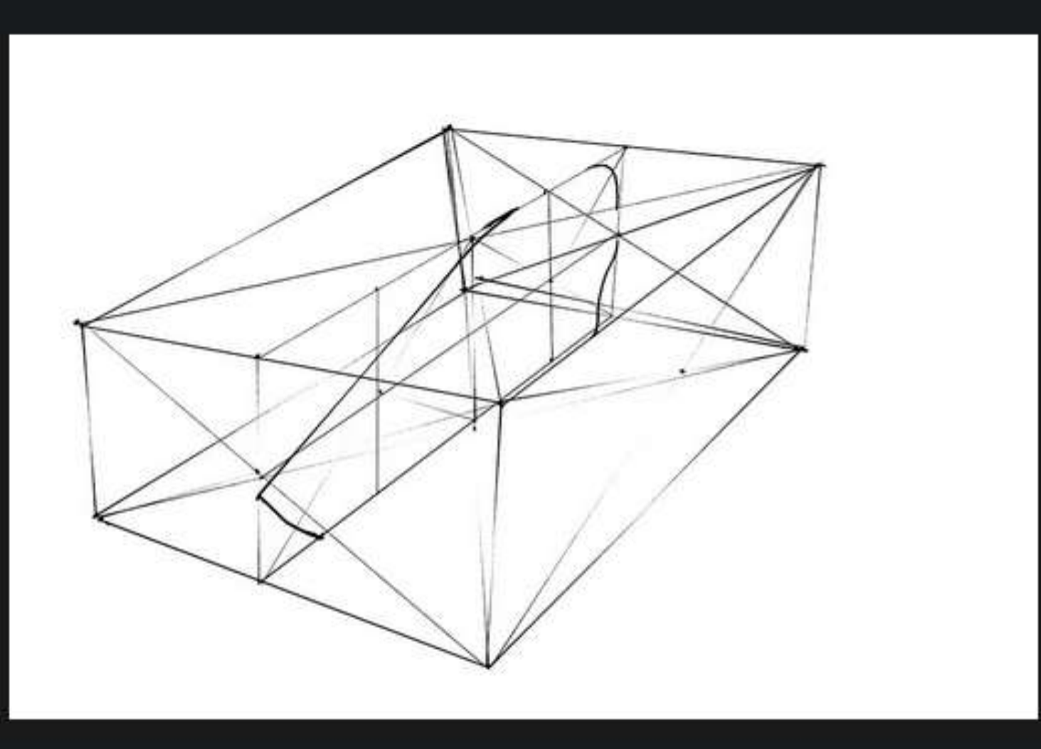


So as usual, I construct a box. Here we're going to be using the encapsulating box approach, but with a bit of a twist. For now, make sure you subdivide the box and draw a line going down the center of the box length-wise, all the way around. Think of this as constructing a plane inside the center of the enclosing form.

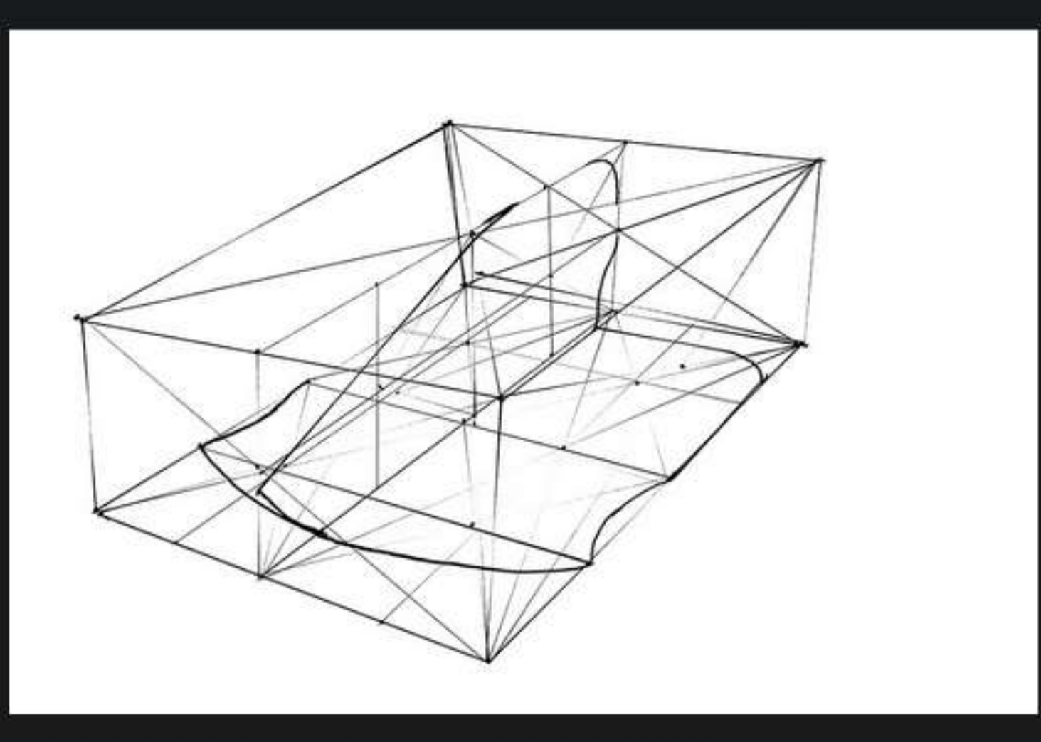


So here's the twist - instead of constructing our object with geometric primitives, we're going to start out by drawing orthographic studies off to the side. That is, a flat drawing of the mouse's profile from the side, and from the bottom. Make sure to factor in proportion, as that is our main focus. Feel free to subdivide these orthographic studies as much as you want, but be sure to subdivide the actual 3D planes as well, as you will be trying to replicate the same shapes there.

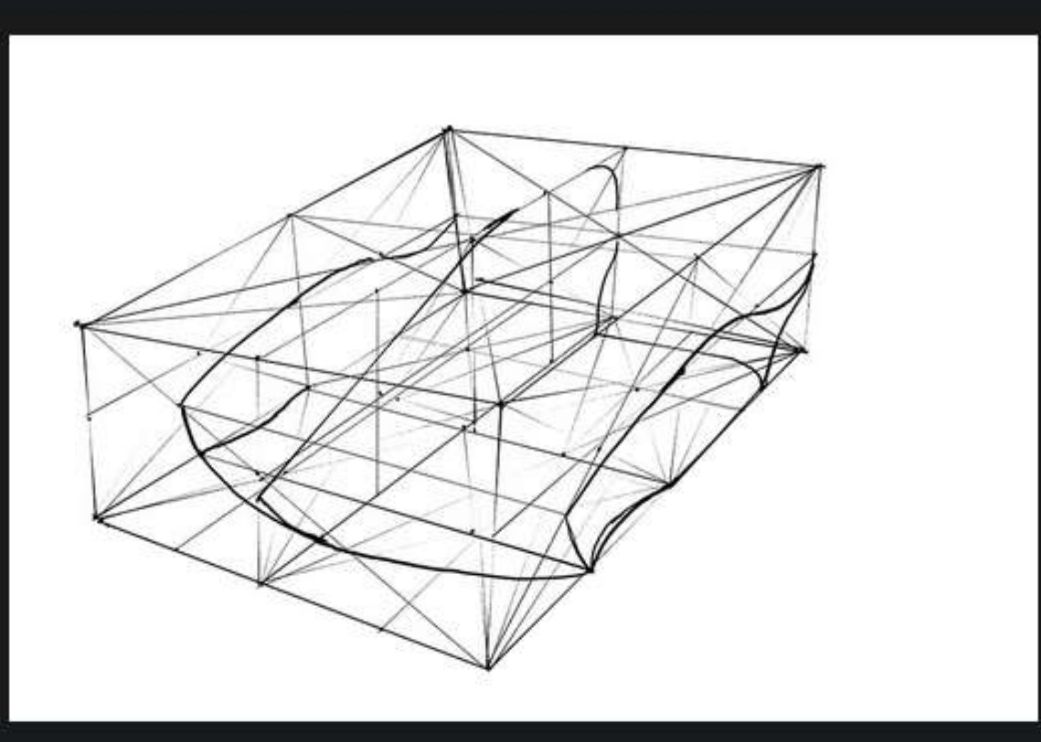
Note: The use of orthographic plans demonstrated here is very loose and basic. For more information on how to leverage these more fully in your own object constructions, be sure to read through these notes and the demo presented there.



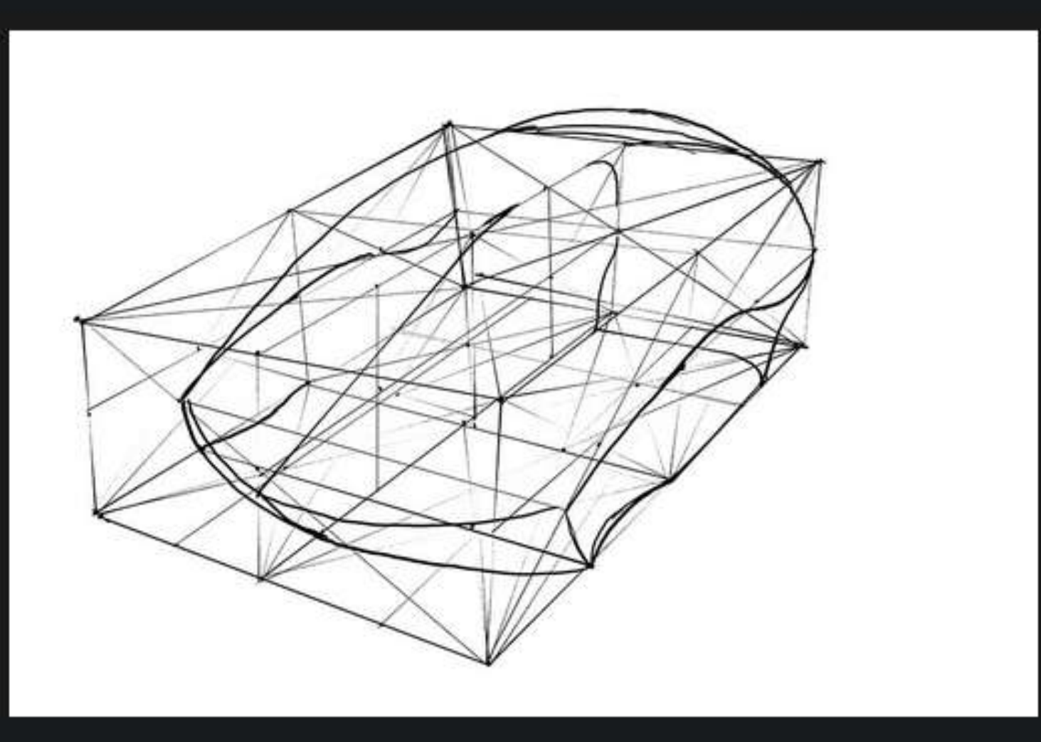
Take your time, and absolutely take advantage of subdivision to transfer the shapes accurately. Don't worry about any major details, just focus on the silhouette. Also, keep in mind how perspective causes distortion, due to the basic principle of things being farther away appearing smaller.



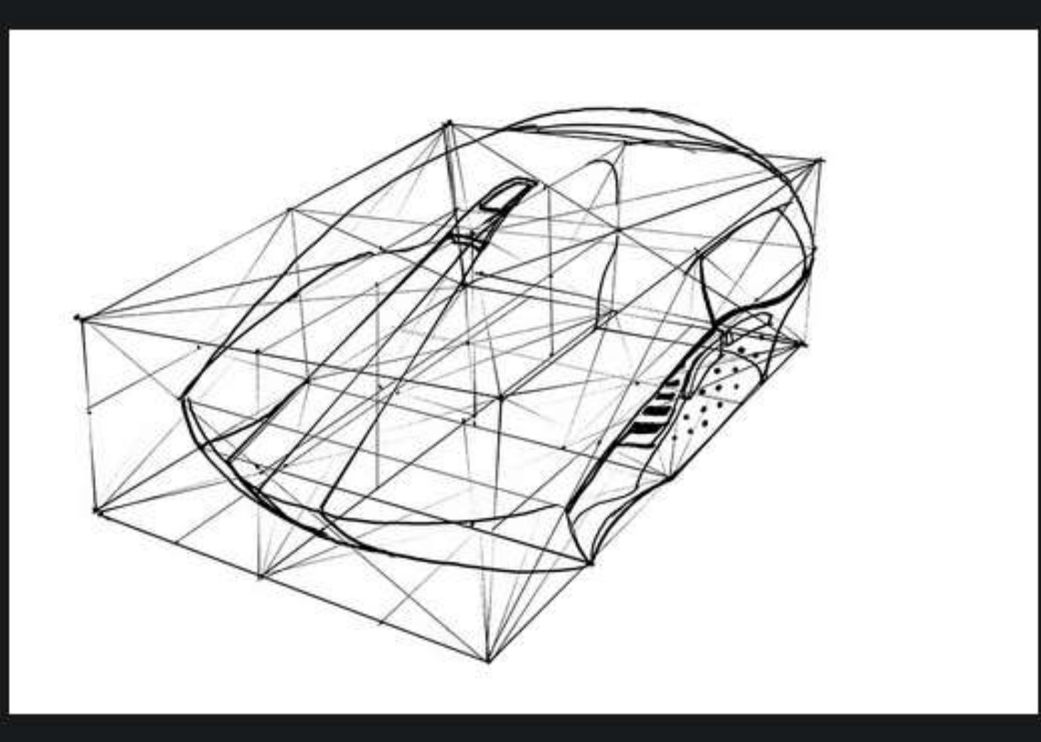
Transferring the base orthographic onto the base plane.



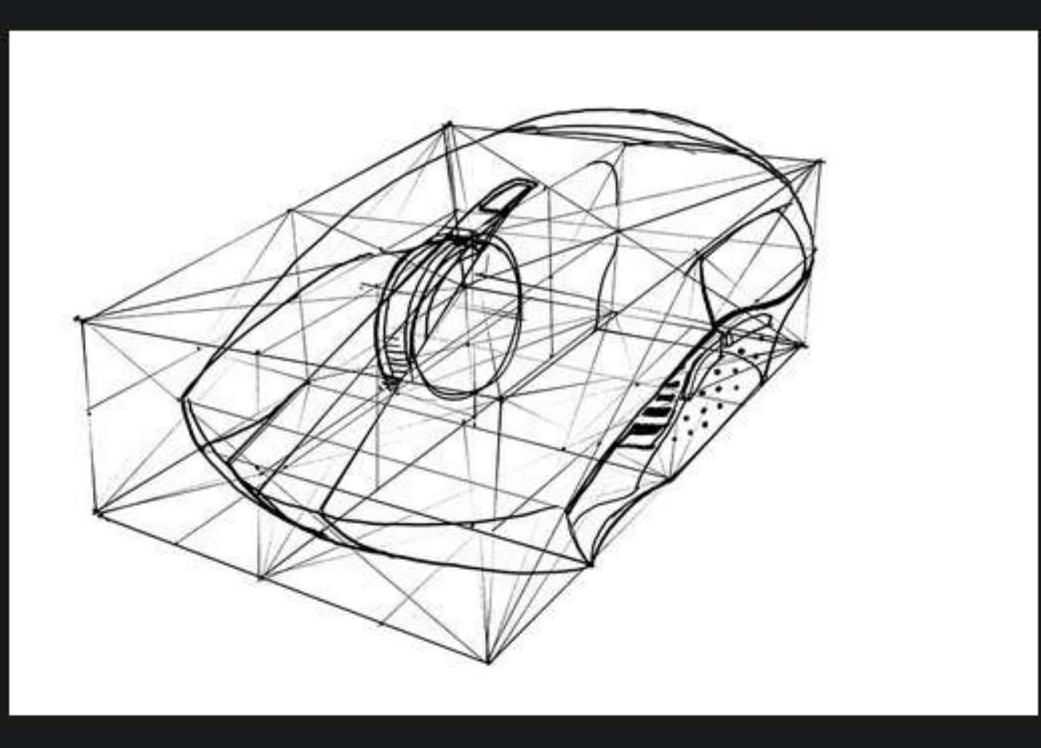
If you look at my side view orthographic, you'll notice that I've included both the overall silhouette as well as the shape that sits on the far sides of the mouse. Just as I transferred the other details, here I transfer this far side information to the planes on both sides of the box. Patience is key here, and make sure you draw the smooth curves from your shoulder, as your wrist will cause them to come out stiff and awkward.



Carefully looking at the overall form of your reference, start connecting the pieces. You'll notice here that initially I tried to do so within the encapsulating box, but I quickly realized that I had underestimated the amount of vertical space needed. It is okay to go beyond your bounds, but don't do so lightly. In most cases it's very important to respect the space enclosed by your box, and to work towards fitting everything snugly inside of it. Beyond a certain point though, mistakes made early on can't really be avoided.

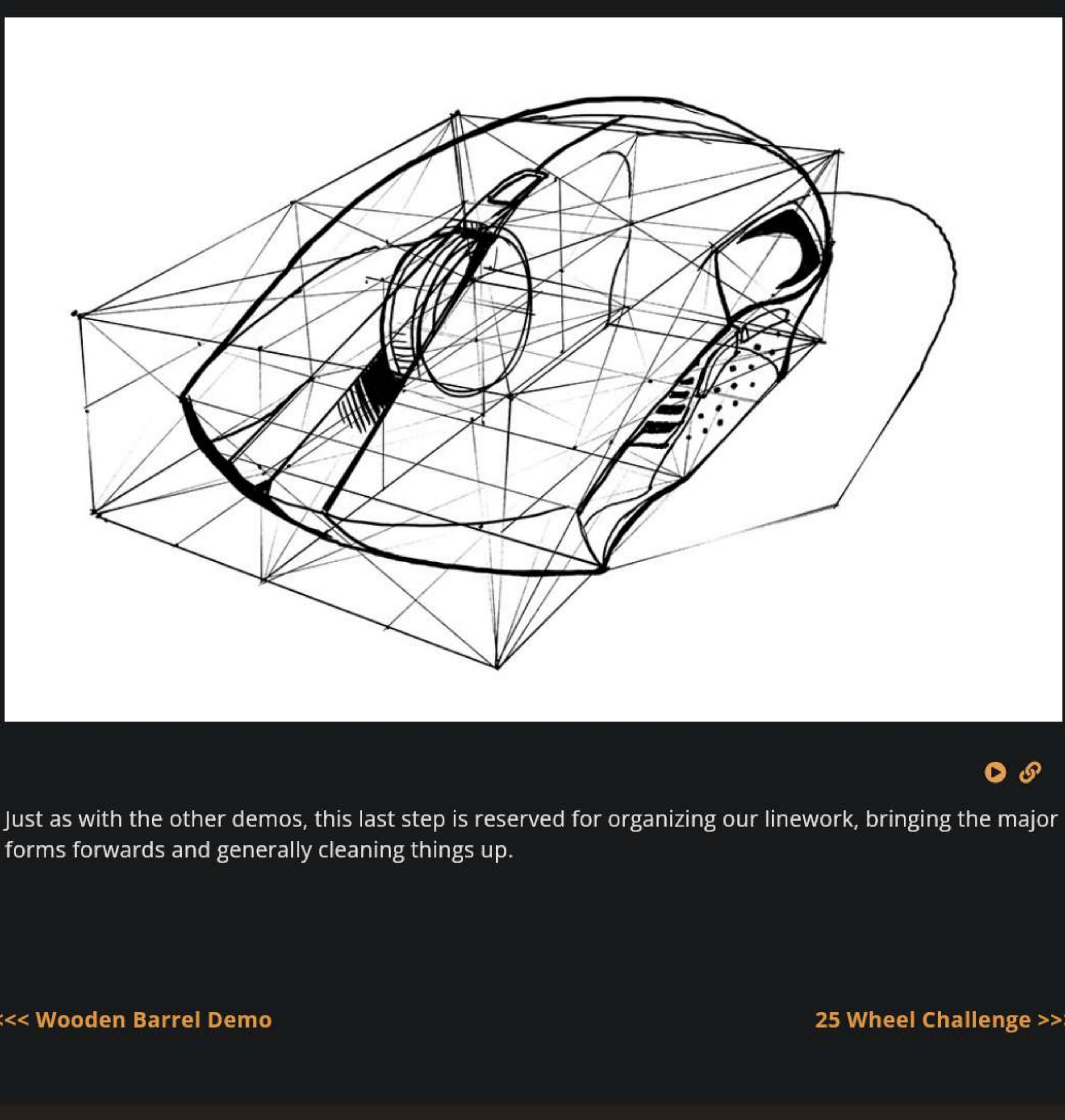


Aside from the extra details I've started adding (probably too early), the major change to the form here is that I cut a substantial gap between the buttons, where the scroll wheel will eventually go. Note that I cut this equally on both sides of the center line, and that I pay close attention to how this cut curves down towards the base.



When constructing the scroll wheel, I draw only one ellipse. You certainly can choose to draw two, and depending on your comfort level with visualization and cylinders in general, it may be the better choice. Still, here I made that decision in order to reduce the amount of clutter. As with everything else, with all of the subdivision, clutter is a major factor here. Still, the solidity of your forms and construction is of the highest priority. One of the main reasons I made that decision was because this was intended as a demo, so clutter would have made it much more difficult to follow.

You could also choose to build this cylinder as a box initially, but again, that would further compound the clutter problem and may not be entirely necessary. Make sure you pay close attention to the proportions and sizing of the scroll wheel in your reference image before beginning this phase.



Just as with the other demos, this last step is reserved for organizing our linework, bringing the major forms forwards and generally cleaning things up.

<<< Wooden Barrel Demo
25 Wheel Challenge >>>

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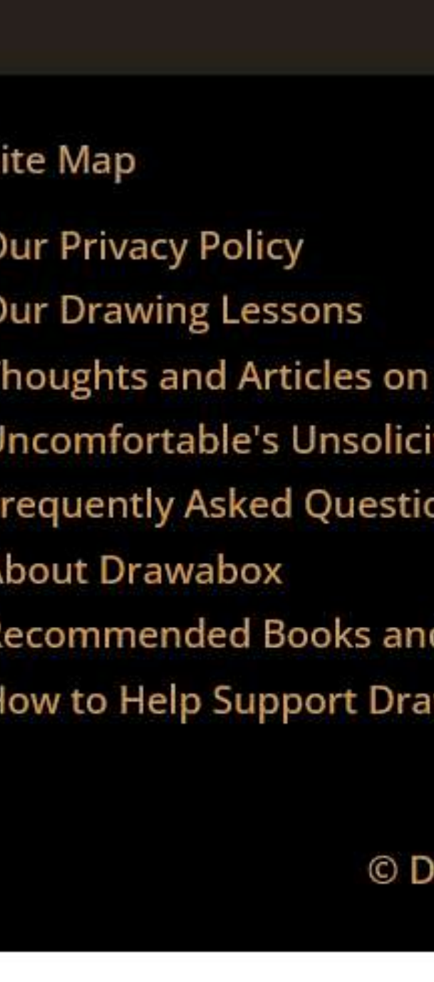
Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.



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The Challenge
  Drawing wheels
  Step by step
  Assignment

25 Wheel Challenge

The Challenge

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HOW TO DRAW A WHEEL
AND WHAT MAKES THEM SO BLOODY SPECIAL
DRAW A BOX

Drawing wheels

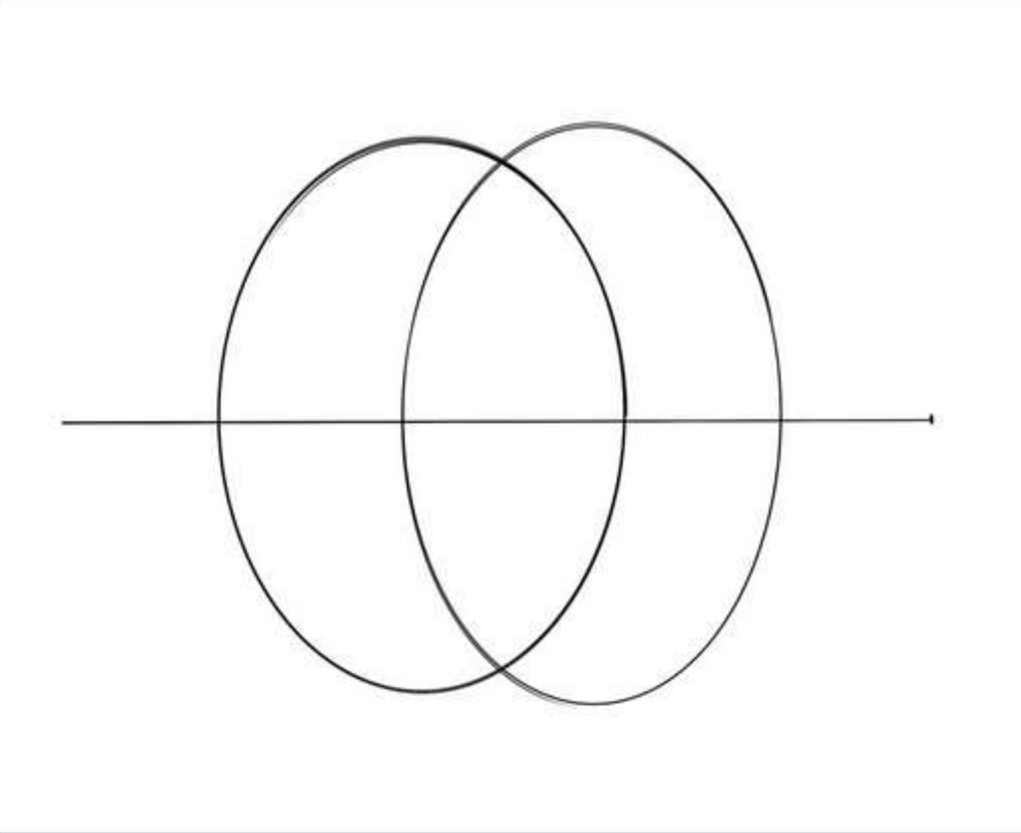
As more and more students have reached the hallowed halls of lesson 7, I've been able to identify certain areas of weakness that need to be covered in order for the lessons to be more effective. This challenge serves as one of them.

I recommend tackling this challenge only after you have completed lesson 6, as well as the cylinder challenge, but before you attempt lesson 7.

Wheels serve as both a difficult aspect of the already significant challenge of drawing cars, but also an interesting summary of what makes cars so difficult. Each and every wheel has a sort of specific character, made up of a series of curves and irregularities in their forms that pertain to each model and make. As such, deviating even a little from this specific combination can make a drawing seem off without fully understanding why.

So, before we tackle the hell that is drawing cars, lets take some time to play with wheels instead.

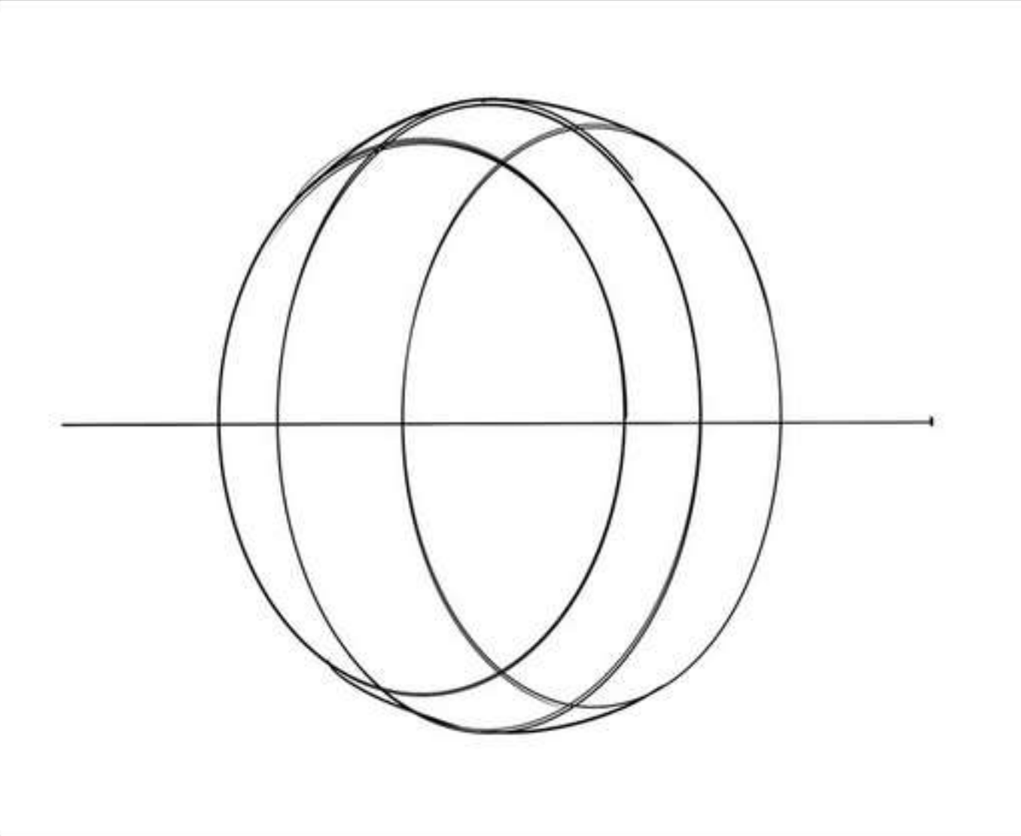
Also worth mentioning: **You are welcome and encouraged to use a ballpoint pen instead of a fineliner for this challenge, along with an ellipse guide if you have one**.



Step by step

The automatic assumption for most is that a wheel is just a cylinder. And it is... sort of. I'd certainly block one in as a cylinder, before I got into greater detail.

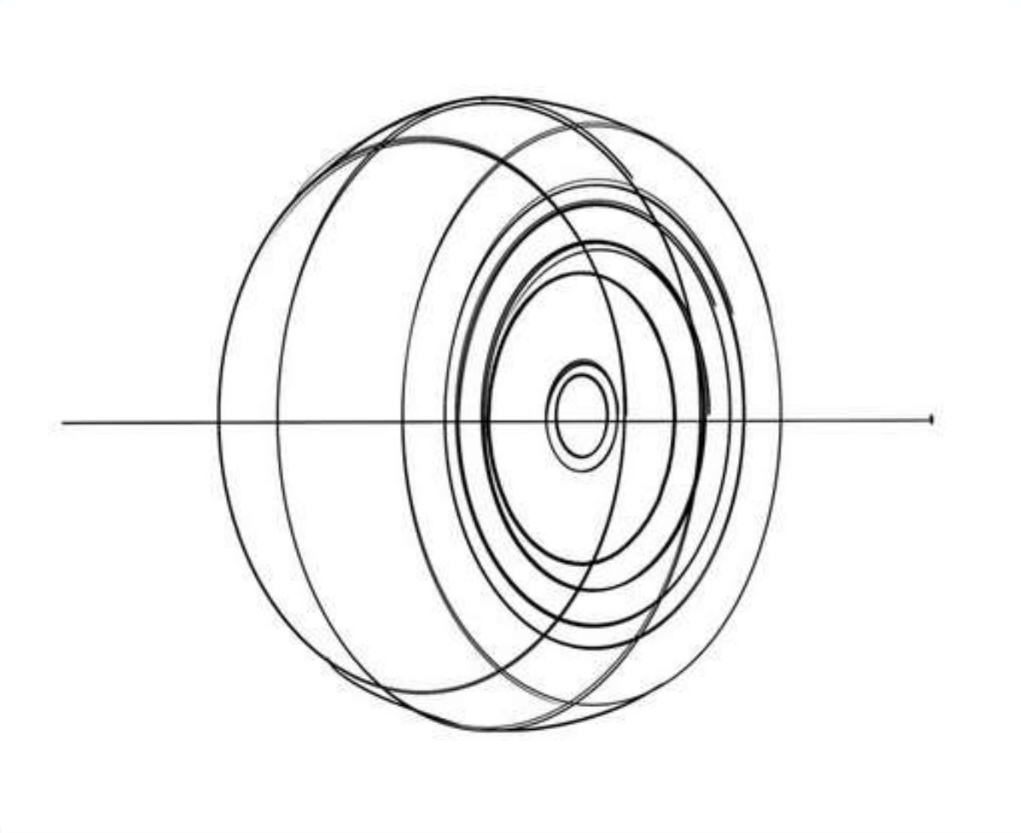
So, lets start out with a minor axis, and align two ellipses along it. The end closer to us should have a narrower degree than the one slightly farther. If you're using an ellipse guide (and I hope you are), be sure to keep track of which specific ellipses you're using for each end, as this will help us when adding any additional ellipses between them later.



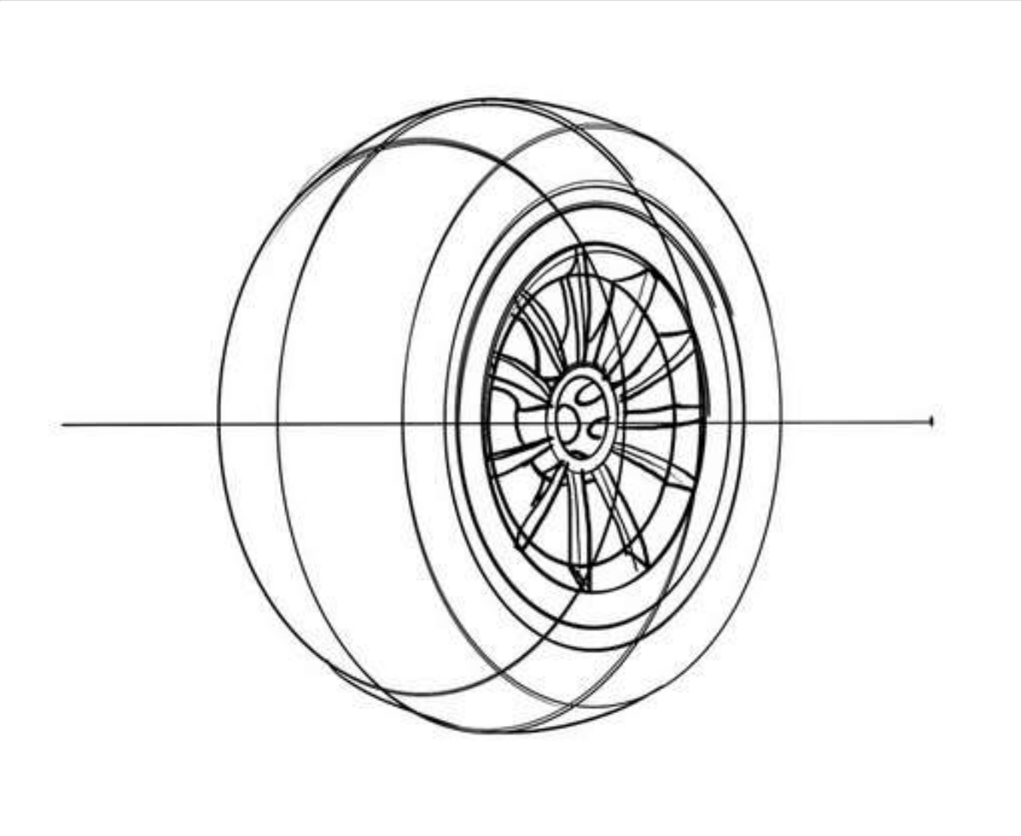
This is where we start to break away from the traditional cylinder. Instead of running straight through, a tire is a little more... bubbly. Through the length of this short cylinder, rather than running straight, it'll have a bit of a curvature to it, having it expand through its midsection. This is an important point many people miss.

It's not always to this extent - sometimes it's quite subtle, but usually there's at least some kind of beveling and curvature, by virtue of the tire being made of rubber and filled with air.

This curvature is the first key component that defines the character of a wheel.

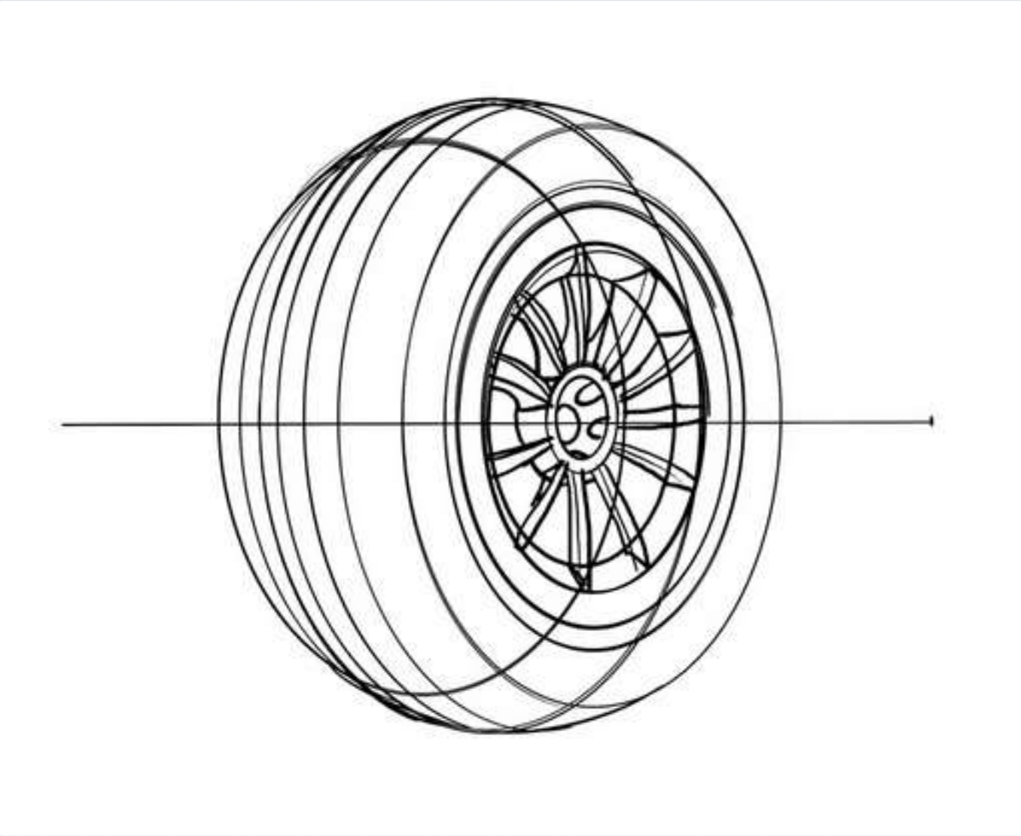


As we'll be mindful of our hubcaps as well, you can achieve a pretty pleasing effect by drawing a bunch of concentric ellipses inside the closer end of the 'cylinder'. I do recommend that you use reference for all of this. There are many features in a wheel that you may not notice without careful study.



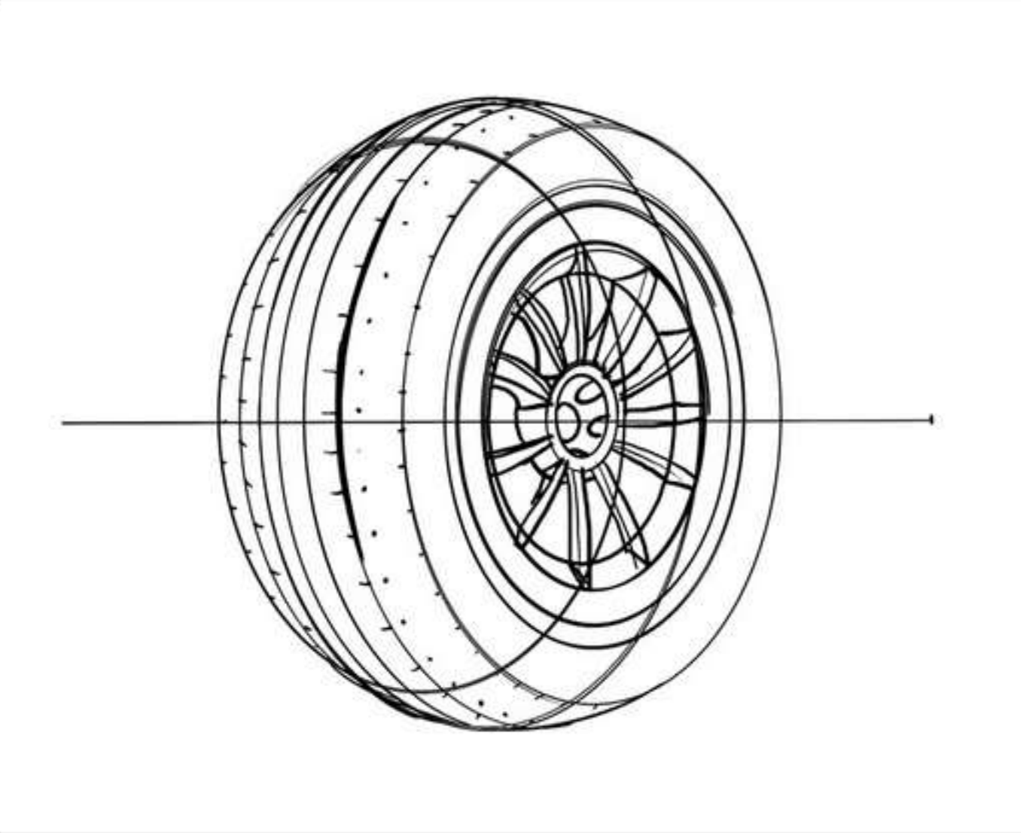
Try to keep your spokes evenly spaced when drawing your rims, as they're never going to be uneven or irregular. Symmetry plays a pretty big role (and on that note, I think I may have forgotten one of the spokes - woops!)

The rims, and the particular configuration of spokes and other similar features is the second of the three major components that define the character of a wheel.



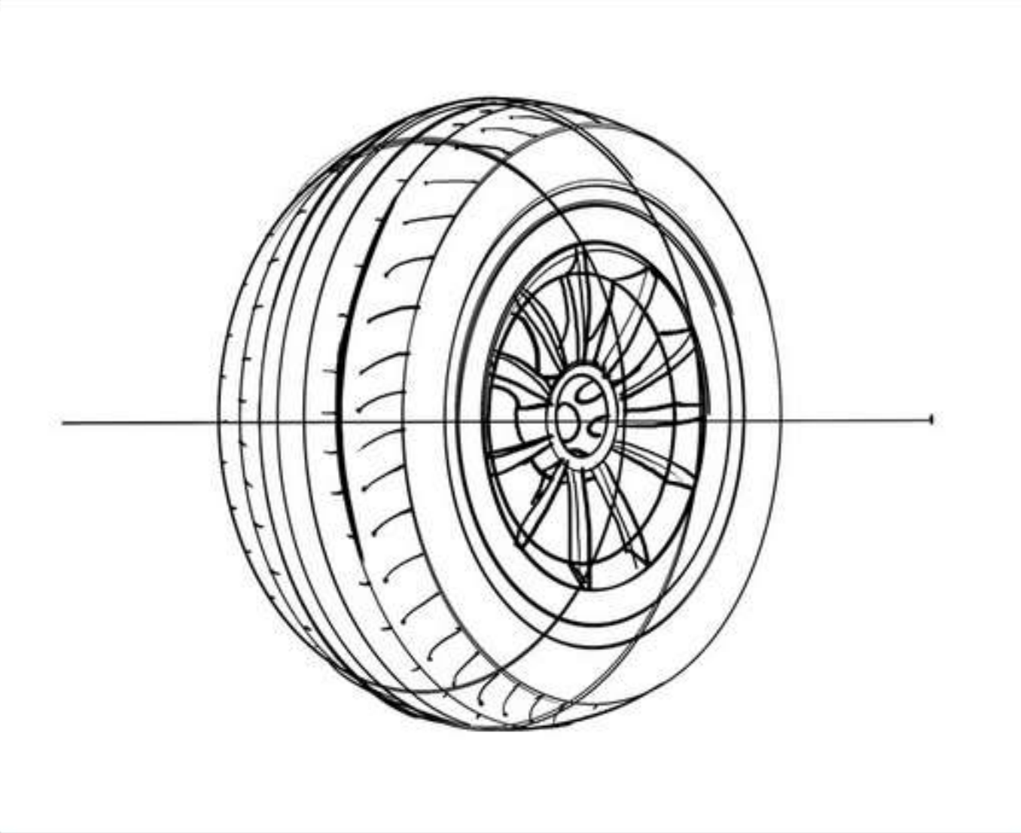
The third and final component of the wheel's character is its tire tread. I often see this either overlooked or rushed, and it is to great detriment of the overall drawing. So take your time, and plan it out.

Here you can see that I've added a number of other ellipses (or at least partial ellipses) between those we'd drawn previously. This is because tire treads are complicated, and I needed more of a "grid" to work off.



Rather than jumping right in, I'm laying down points along these columns I'd drawn in the previous step. You'll see that some of the points line up to one another, while others are more staggered, falling in between the others. This is all based on the reference I'm using - so again, use reference and study it carefully as you go.

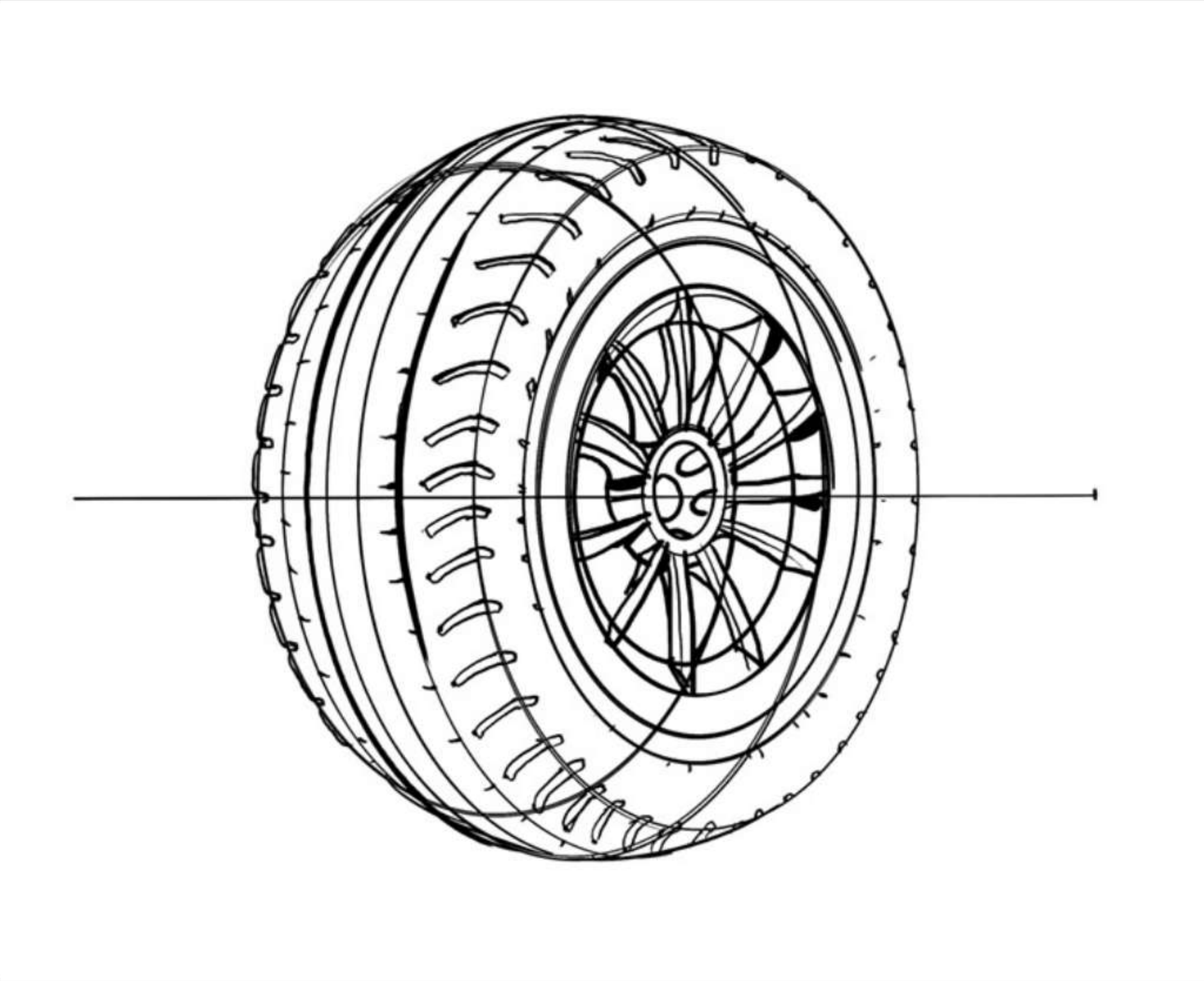
Notice how the space between the points is fairly generous towards the center, but it gets compressed as the surface of the tire turns away from the viewer (along the top and bottom).



These treads have some pretty big grooves towards the outside, and each of these grooves has a bit of a hooking curvature towards its inside end. Notice how that hook gets shallower towards the top and bottom, where the space gets compressed and the surface turns away.

I draw one line of each groove to define this hooking feature getting shallower and shallower. I don't want to draw the entirety of each groove just yet - not until I've got a bit of each one planned out.

I'm very much following a pattern of attack that involves progressing the whole wheel a little bit at a time, rather than focusing in on one particular part before moving onto the rest.



And with a few finishing touches - drawing the remainder of each groove, adding some SUBTLE bumps along the silhouette (I don't want this to look like some kind of monster truck wheel), my wheel is complete.

On that note however, if you were drawing an exceptionally large wheel, there are certain kinds of features that you'll find won't get bigger or smaller regardless of the size of the object. Tire treads are one of these - even if the wheel is very large, the tread should remain *roughly* the same size.

This means that you can imply a very large wheel by making the tread considerably smaller relative to that object. The same principle can be applied to all kinds of things, and I've come across it quite a bit when drawing space ships. Windows, cut-lines, rivets and bolts, all of these things do not get bigger just because the object they're on is scaled up. As such, making these kinds of things smaller relative to the whole of the object can help you convey the idea that this object is truly massive and not just a fancy toy.

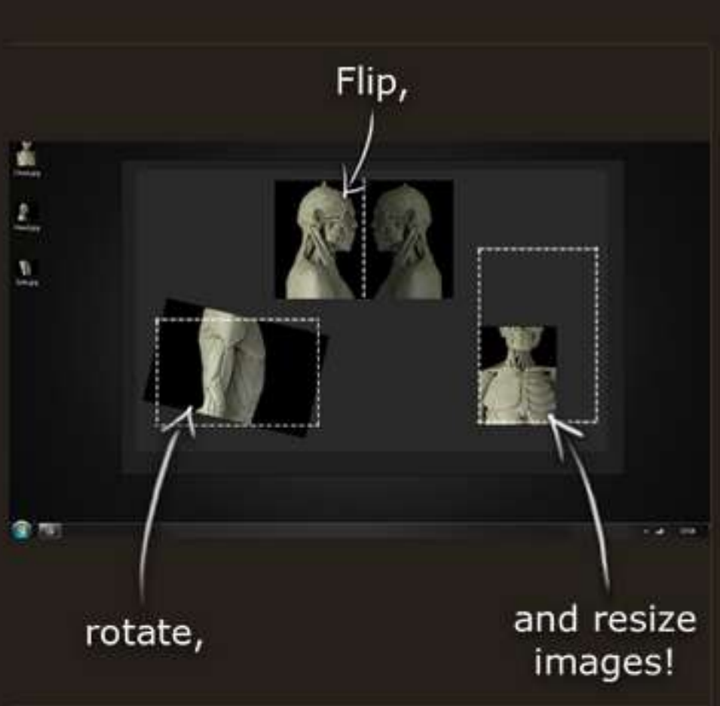
Assignment

In order to complete this challenge, you must complete the following, using ballpoint pen, and an ellipse guide if you have access to one:

- 25 individual wheel drawings, from reference, drawn at different angles.

If you're freehanding, don't draw these small - give yourself lots of room to work through the spatial problems and the various levels of detail that are necessary in the wheel's rims and its tire tread. If you are using an ellipse guide however (or looking to buy one), you *will* find two options - either a full set of ellipse guides with many different sizes and degrees (which is often prohibitively expensive), or a single "master ellipse template" - a sheet with ellipses of many different degrees, but with only a few different size options. The master ellipse template is entirely sufficient for what we're doing both here in the wheel challenge, and in Lesson 7, so you're certainly okay to use that. Your wheels will be small, but you'll likely find that working with an ellipse guide (even a smaller one) will make this challenge considerably easier.

Applying Construction to Vehicles >>>



PureRef

This is another one of those things that aren't sold through Amazon, so I don't get a commission on it - but it's just too good to leave out. PureRef is a fantastic piece of software that is both Windows and Mac compatible. It's used for collecting reference and compiling them into a moodboard. You can move them around freely, have them automatically arranged, zoom in/out and even scale/flip/rotate images as you please. If needed, you can also add little text notes.

When starting on a project, I'll often open it up and start dragging reference images off the internet onto the board. When I'm done, I'll save out a '.pur' file, which embeds all the images. They can get pretty big, but are way more convenient than hauling around folders full of separate images.

Did I mention **you can get it for free**? The developer allows you to pay whatever amount you want for it. They recommend $5, but they'll allow you to take it for nothing. Really though, with software this versatile and polished, you really should throw them a few bucks if you pick it up. It's more than worth it.

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- Step by step

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- Establishing our box
- Constructing our wheels
- The hard part

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Lesson 7: Applying Construction to Vehicles

Overview

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Prerequisites

Along with completing all the lessons up to 6 as well as the box and cylinder challenges, before starting this lesson you will be required to complete the 25 wheel challenge as well.

About your tools

Up until lesson 5, I've been very adamant drawing everything freehand, with felt tip pens, and so on. And this has been for a good reason - it's important to maintain a certain degree of the right kinds of challenges to ensure that you guys gain as much as you can from each lesson.

This lesson, however, is going to be a little different. I am allowing, and in fact encouraging the use of the following:

- Ballpoint pen for your linework (don't switch pens to do any sort of "clean-up" pass - use the same pen through all your lines, including construction/box subdivision/etc)
- Brush pens for filling in large areas with solid black
- Rulers/straight edges for drawing precise construction lines
- Ellipse guides for constructing and aligning your ellipses
- French curves for any complex, curving lines

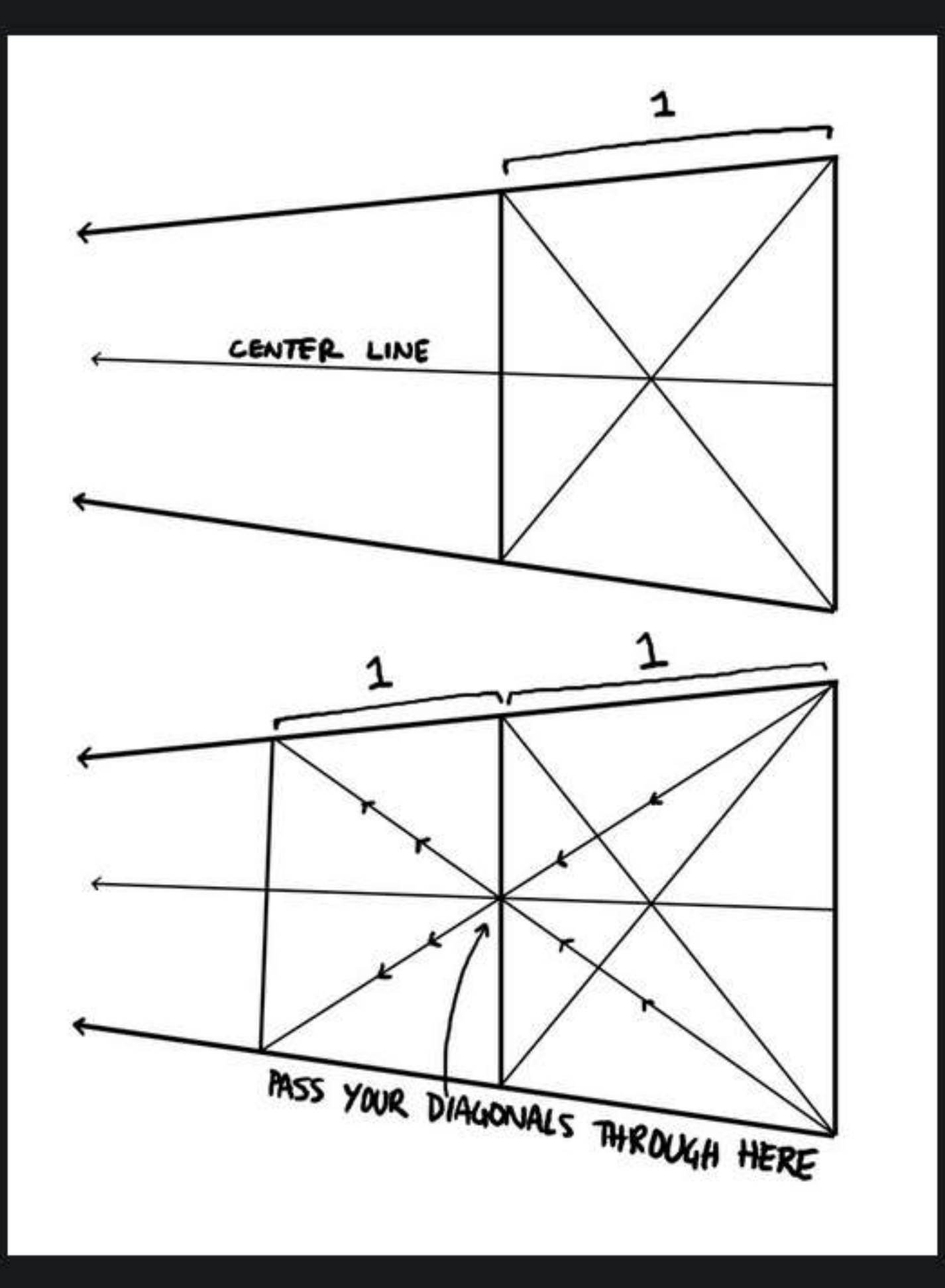
Whenever drawing freehand, I still want you to apply the methodology I've outlined in the past - the ghosting method, drawing through ellipses, and so on. That said, in this case it is inevitable that with all of the necessary construction lines, and the significance placed on precision, it's important for you to be able to use tools that will allow you to focus more on the meat of the lesson, which is really about the manipulation and construction of complex compound forms.

As before, do not use pencil or digital media.

Introduction

NOTE ABOUT THE VIDEO: In the intro video I mention that you can use a ballpoint pen to lay down your basic guidelines, then switch to a fineliner. Instead I want you to stick to one kind of pen (ballpoint pens are better in this case), and NOT switch to a different pen type halfway through.

Now we're moving onto vehicles - the last of the dynamic sketching lessons, as far as I've planned. This lesson is very similar to the last one, the only difference being scale. It's definitely an interesting experience, drawing these subjects from life - especially the first two: trains and tanks. Wrapping your head around an object so much larger than you can be tricky at times, and it makes for great practice.



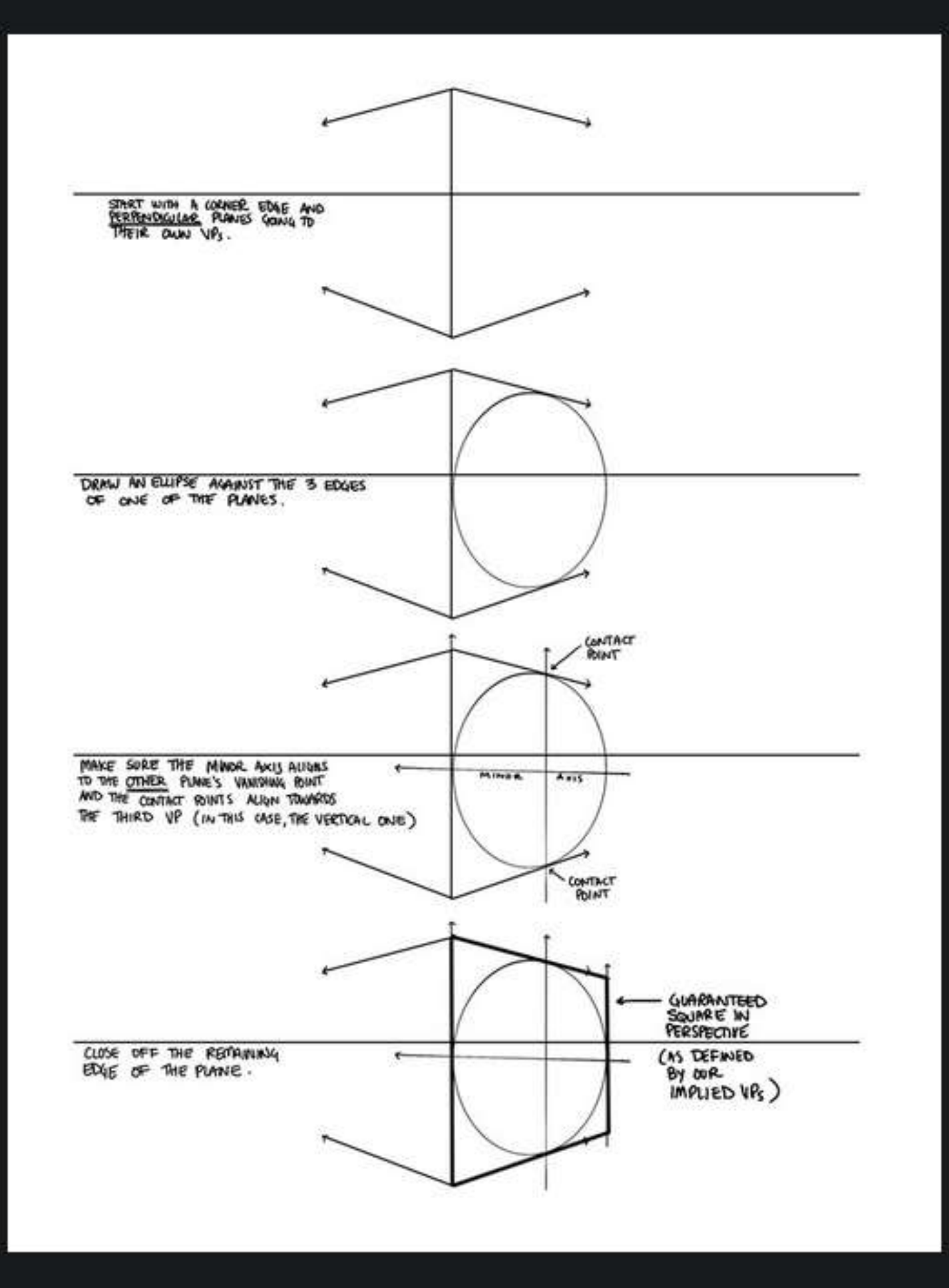
Repeating measurements in space

In the previous lesson, we talked about how we can find the center of a plane in perspective, and use that to subdivide it in a number of ways.

You can also use the reverse of this concept to take a measurement you already have and repeat it back or forwards in perspective (very handy for placing wheels). Since we know that the diagonals of a plane will intersect at its center, you can treat two planes that are side-by-side and equal in length as being two halves of the same plane (I'll refer to it as the compound plane).

Knowing this, if you have a center-line running through them in one dimension, the center of this 'compound plane' lies at the point of intersection of that center line with the line that separates the two individual planes.

To copy the measurement over, just draw a diagonal from the corner of your plane through that midpoint of the opposite edge, as shown here.


START WITH A CORNER EDGE AND PERPENDICULAR PLANES GOING TO THEIR OWN VPs.
DRAW AN ELLIPSE AGAINST THE 3 EDGES OF ONE OF THE PLANES.
CONTACT POINT
MAKE SURE THE MINOR AXIS ALIGNS TO THE OTHER PLANE'S VANISHING POINT AND THE CONTACT POINTS ALIGN TOWARDS THE THIRD VP (IN THIS CASE, THE VERTICAL ONE)
MINOR AXIS
CONTACT POINT
GUARANTEED SQUARE IN PERSPECTIVE (AS DEFINED BY OUR IMPLIED VPs)
CLOSE OFF THE REMAINING EDGE OF THE PLANE.

Creating a square in perspective

People ask about this every now and then, and it isn't until this point that I'd actually feel it appropriate to teach this technique (although it is referenced in the cylinder challenge as well).

Basically, you can construct a proportional square in 3D space relative to two perpendicular vanishing points (that is, vanishing points whose sets of lines are perpendicular to one another) - it's just a downright pain, especially if you don't have an ellipse guide.

1. Start out with two perpendicular planes set edge to edge, forming a corner. Leave the far ends of these planes open, as we haven't yet determined their lengths.
2. Pick one of these planes to turn into a square - you can do the other one afterwards by applying the same steps. In this chosen plane, draw an ellipse.
3. This ellipse must meet two criteria - first, its minor axis (the line that cuts it into two equal, symmetrical halves down its narrower span) must align to the same vanishing point **as the other plane**. Not the plane it's on, that's a common mistake. Secondly, the points at which the ellipse contacts the two parallel lines of its enclosing plane must align towards the third vanishing point (which in this case is the vertical one).
4. Assuming that these criteria have been met, then this ellipse represents a proper circle in 3D space, and therefore any plane enclosing it will represent a square. You can go ahead and close off your plane so the final edge just touches the exposed side of the ellipse - you may need to extend the other edges, as I've done here.

Now there's nothing stopping you from applying these steps to the other plane once you've handled the first. With those two planes properly set up as squares, you've essentially got everything you need to create a cube, and from there you can apply the repeating measurements technique above to extend that cube to whatever set proportions you like.

If you especially enjoy drawing vehicles, you may want to check out the following lessons from Charles Hu's Dynamic Sketching course on our sponsor, **New Masters Academy**:

- Drawing Cars
  In this lesson, Charles explores the elements of cars (with a particular focus on the classics), from their proportions, to their structural components, including their wheels.
- Drawing Military Vehicles
  With a particular focus on tanks, Charles examines the ways in which they differ from one another, and the structures of their wheels, treads, and other common components in heavy duty military vehicles.
- Drawing Planes
  From classic biplanes to sleek fighter jets, Charles explores their structure and how we can use markers, and white pastel pencils/gel pens to build up texture on their rendered surfaces.

In addition to these lessons, you may also want to check out the following from Erik Olson's Linear Perspective Master course:

- Perspective 16: Various Intersecting Objects and Planes
  In the latter half of this lengthy lesson, Erik explores a race car and a blimp with a heavy focus on technical perspective, leveraging orthographic plans and proportional studies, and using them to build up solid, precise, and accurate structures within a shared scene.

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Orthographic plans

In Lesson 6, we introduced the use of orthographic plans to lay out our objects in two dimensions, and then transfer that information into the third dimension. While the demonstrations available in this lesson demonstrate this to varying degrees (ranging from not at all, to more loosely, to somewhat specifically), **a more complete use of this tool as introduced and demonstrated here in Lesson 6 is well worth using for your own vehicle constructions in this lesson**.

You won't need to use them for the "form intersection vehicle" exercise, as **these are just the form intersection exercise, with the forms laid out in the general structure of a vehicle** and does not involve taking it any further than that. For your more detailed vehicles however, ensure that you leverage orthographic plans and include them in your submissions.

When the overhaul of the course does eventually reach this far into the lesson, this material will be integrated into new video demos, but for now these reminders will help fill the gaps.

Homework and exercises

Before starting the homework, be sure to go through all of the demonstrations included in this lesson. I strongly recommend drawing along with them as well and following them closely when doing so.

Also, remember that this homework must be drawn from reference. When looking for reference, I recommend that you specifically look for those of a higher resolution. Google's image search tools allows you to limit your search to *large* images, and I recommend you take advantage of this. It also wouldn't hurt to do a few studies from life (at least when tackling cars). You may even want to see if you've got any kind of museums near by that feature relevant objects.

The homework assignment for this section is as follows:

- 1 page of form intersections from lesson 2.
- 1 page of cylinders in boxes, along with the error-checking method. You may do these with an ellipse guide.
- 4 pages of form-intersection vehicles. These are purely constructional, approach them as you might the form intersections from lesson 2, by drawing primitives (boxes, cylinders, etc). Focus on drawing through your major geometric forms. you can break them down as far as you like, but remember that we're not interested in the smaller details - just on laying down the primitive forms in the arrangement of a vehicle. Do not use grids, subdivision, etc. Just simple primitive forms as you'd draw them for the form intersections exercise, focusing on each individual primitive form, one at a time.
- 8 pages of vehicles. Mix it up - you don't just have to do things with wheels. Boats, planes, wagons, space ships, etc. are more than welcome. As long as it is used as transport and is large enough to hold a human being within it, it's fair game. **Include your orthographic plans**.

You are welcome to use an ellipse guide, a ruler, and a ballpoint pen if you wish. No pencil or digital media, and stick to one kind of pen for your linework (though a brush pen can be used to fill in large dark areas if appropriate).

Video Lectures >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

Staedtler Pigment Liners

These are what I use when doing these exercises. They usually run somewhere in the middle of the price/quality range, and are often sold in sets of different line weights - remember that for the Drawabox lessons, we only really use the 0.5s, so try and find sets that sell only one size.

Alternatively, if at all possible, going to an art supply store and buying the pens in person is often better because they'll generally sell them individually and allow you to test them out before you buy (to weed out any duds).

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Lesson 7: Applying Construction to Vehicles

Video Lectures

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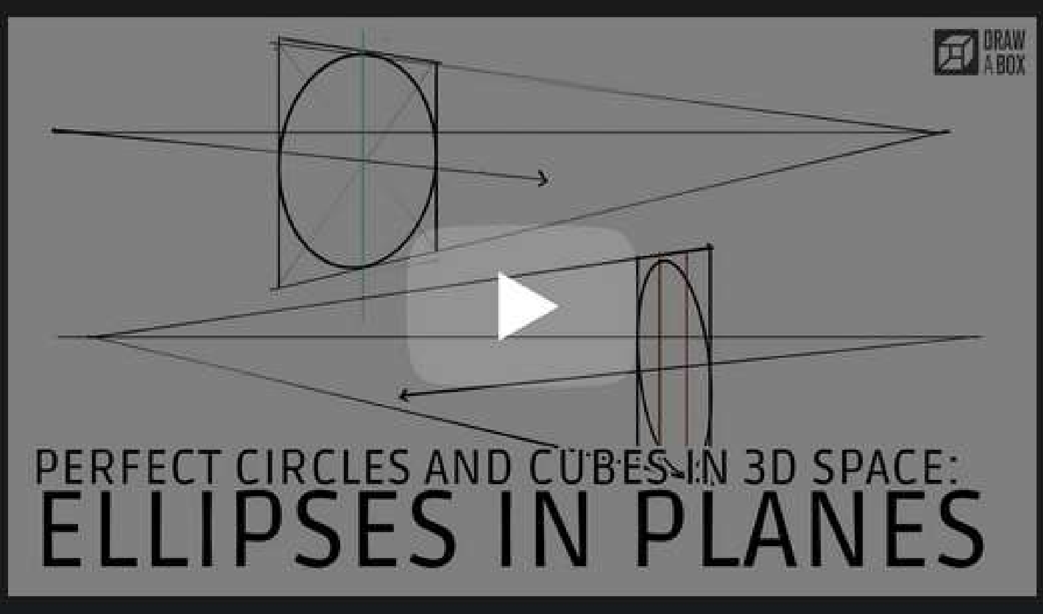
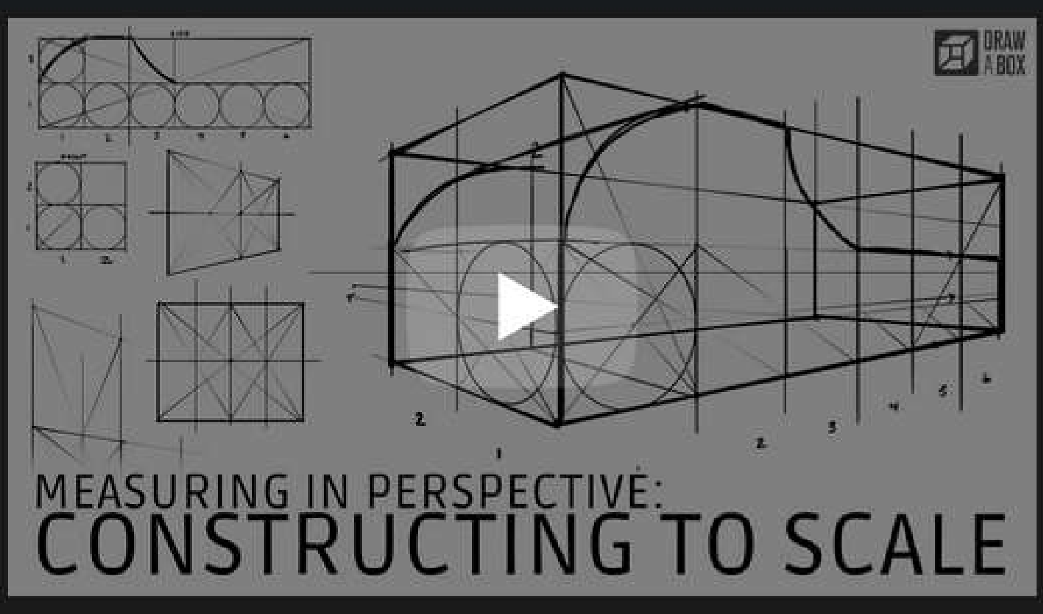
LISTEN WITH DRAWABOX

As the topics pertinent to this lesson tend to get pretty complicated, there are a couple video demos covering some especially important topics. I do recommend that you read the notes on the first page of this lesson before watching these videos, as they'll help prepare you for some of the topics I cover here.



Ellipses in planes

Not every ellipse we draw will inherently represent a circle in 3D space. When you're drawing them as a part of a larger construction, you have a lot of other elements with which you must remain consistent. This video goes over the criteria that determines whether an ellipse represents a proper circle, when compared against a set of vanishing points.

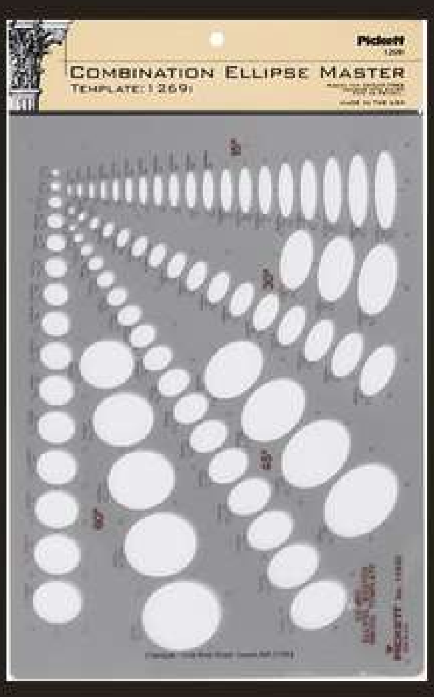


Constructing to scale

While Drawabox generally deals with the "good enough" school of approximation, there are cases where knowing how to construct an object to a specific scale is very useful. In this case we're still going to apply some approximation techniques, but this is still probably the most technical we ever get.

<<< Overview

Cab-Over Truck Demo >>>



Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.

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Cab-Over Truck Demo

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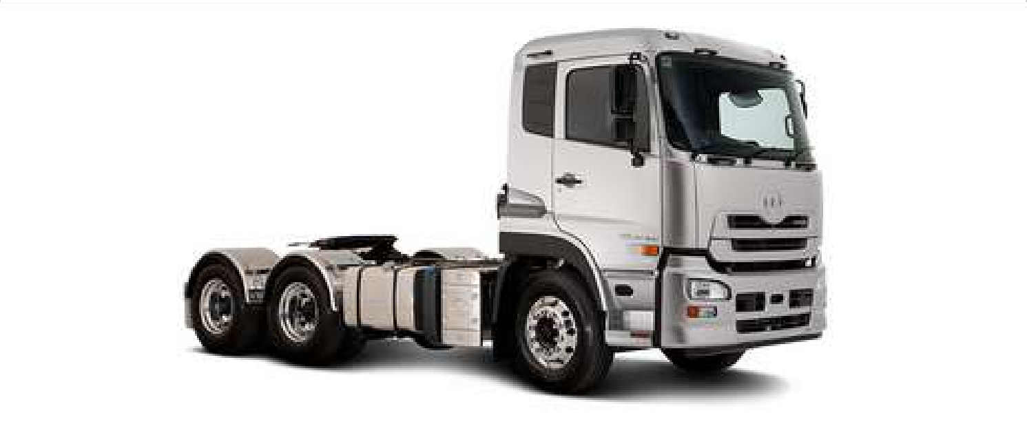
Demo Video

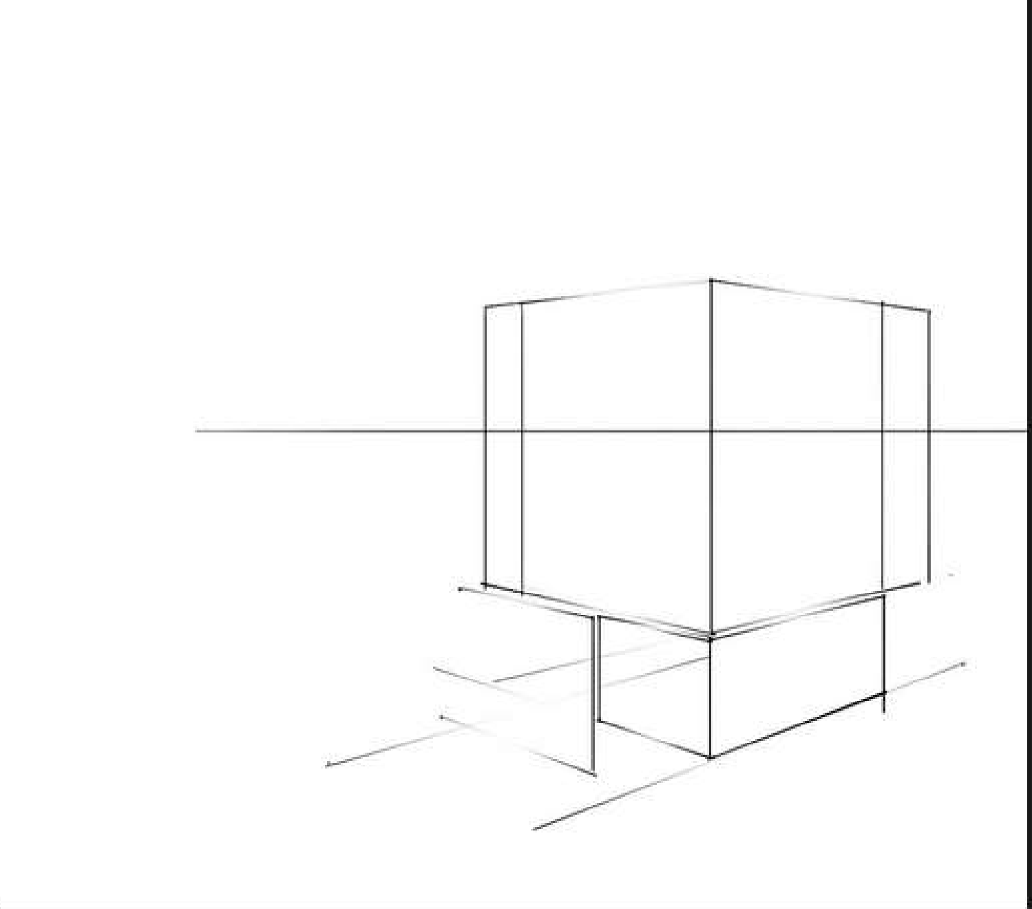
I wanted to start off with something at least somewhat straight forward - this cab-over style of truck is pretty much a few boxes and a few cylinders. Unfortunately things do get complicated when we get into its detail (and I stumble on it myself, as you'll see) but the core construction of it as straightforward as can be.

This recording has no accompanying audio commentary.



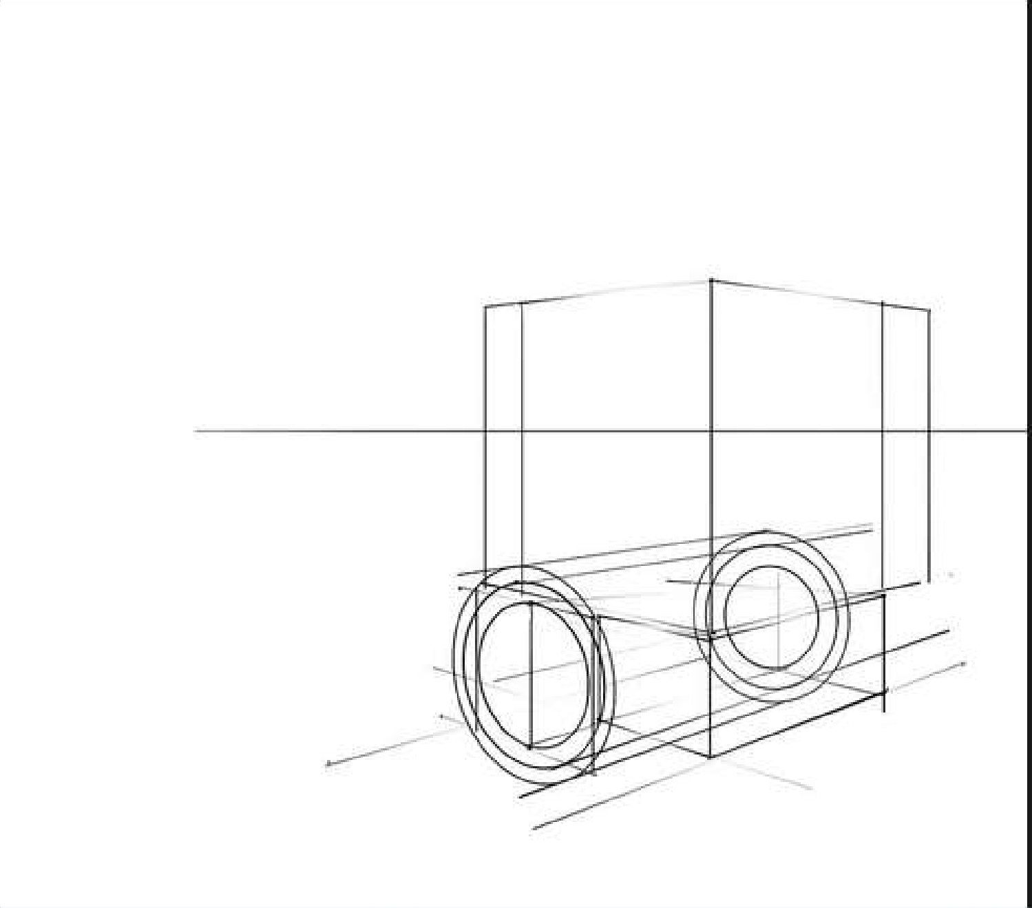
Reference

This is the reference we'll be using - it's a pretty classic truck you'll see on the road, and it's got some nice distinct wheels.



Step by step

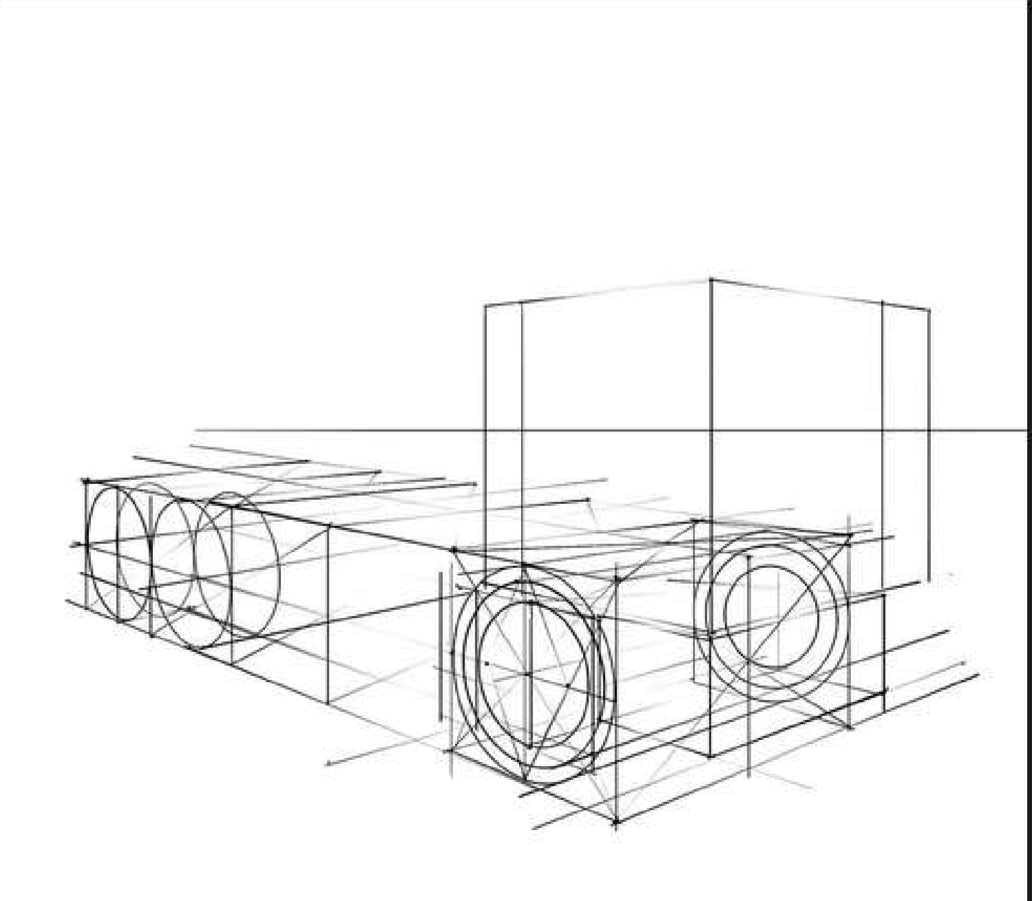
While the rest of this lesson will focus very heavily on proportion studies, for this one I wanted to jump right in, due to the relatively simplistic construction. I set in a simple box (which right off the bat I made too wide, so I had to cut it back a little on the right side of the drawing), a box underneath and the beginnings of a plane for the wheel. Notice that I defined one vertical line and two lines going off to the left, with no second vertical. This is because we don't yet know where that second vertical should go. We want this plane to be a perfect square (so it can contain the wheel, a perfect circle), so we'll be using the techniques outlined in the videos above.



So here you've got a cylinder with three concentric ellipses on each side. The reason for this is... well, my wheels weren't big enough to start with, and in my second attempt they still weren't big enough. Yeah, there's no magic here. The inner-most ellipse is the result of what we were doing in the previous step - I laid in the ellipse so that it fit snugly between the first vertical and the two horizontals, and I used a degree that made it so the contact points above and below (where the ellipse touches those top and bottom horizontal lines) align vertically. As explained in the videos, this only matches up when the ellipse accurately represents a perfect circle within the context of this perspective system. Once this has been achieved, we can draw the remaining vertical to close off the ellipse in a plane - which also happens to now represent a perfect square in 3D space.

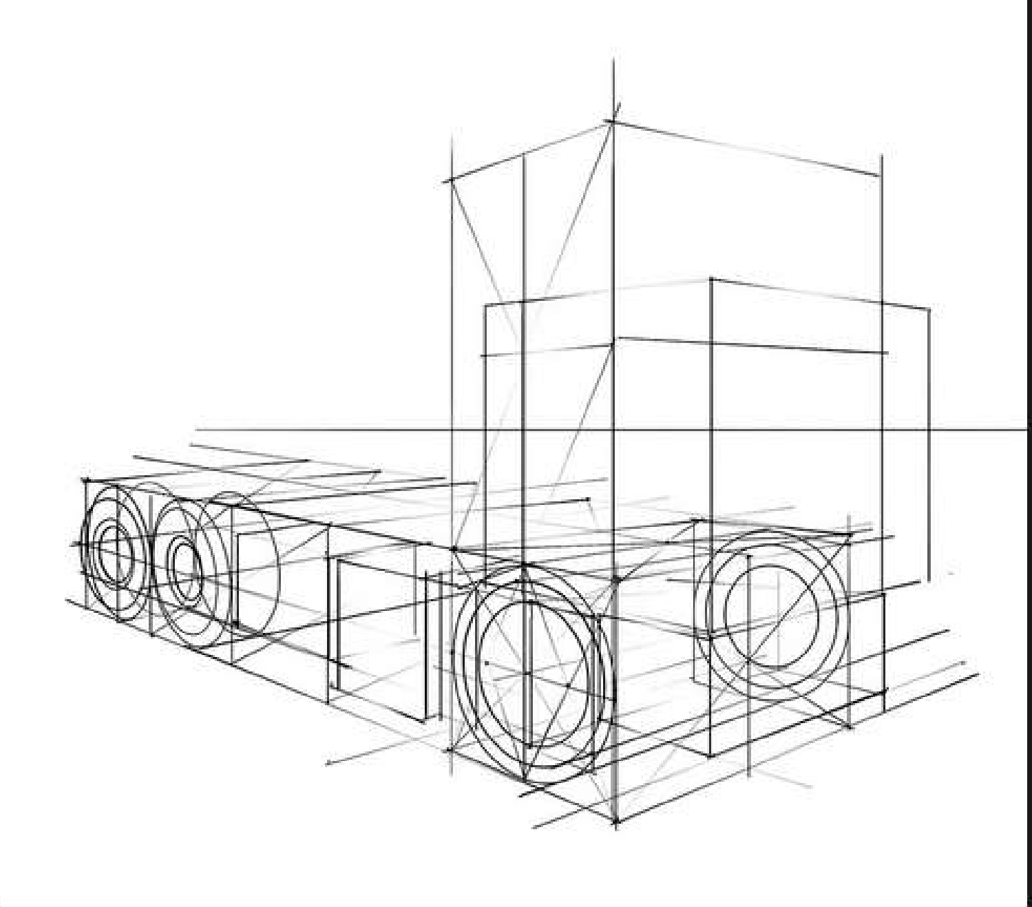
Note: Freehanding ellipses with all of this business of specific degrees and matching up contact points is hard. You're not likely to get it down perfectly, so as I mentioned above, you are free to use ellipse guides, rulers, etc. to make your life easier. If you happen to do it freehand, that's fine as well, just don't get frustrated if you don't nail your ellipses. A bit of deviation won't ruin things, it's totally fine.

Another thing worth mentioning here is that unless your wheels are at an angle relative to the body of the vehicle, you should start the wheels on the same axle off as a single cylinder. You can cut them up later, but in general it's a lot easier to work through these phases with larger cylinders rather than squatter ones already cut to the size of each individual wheel.

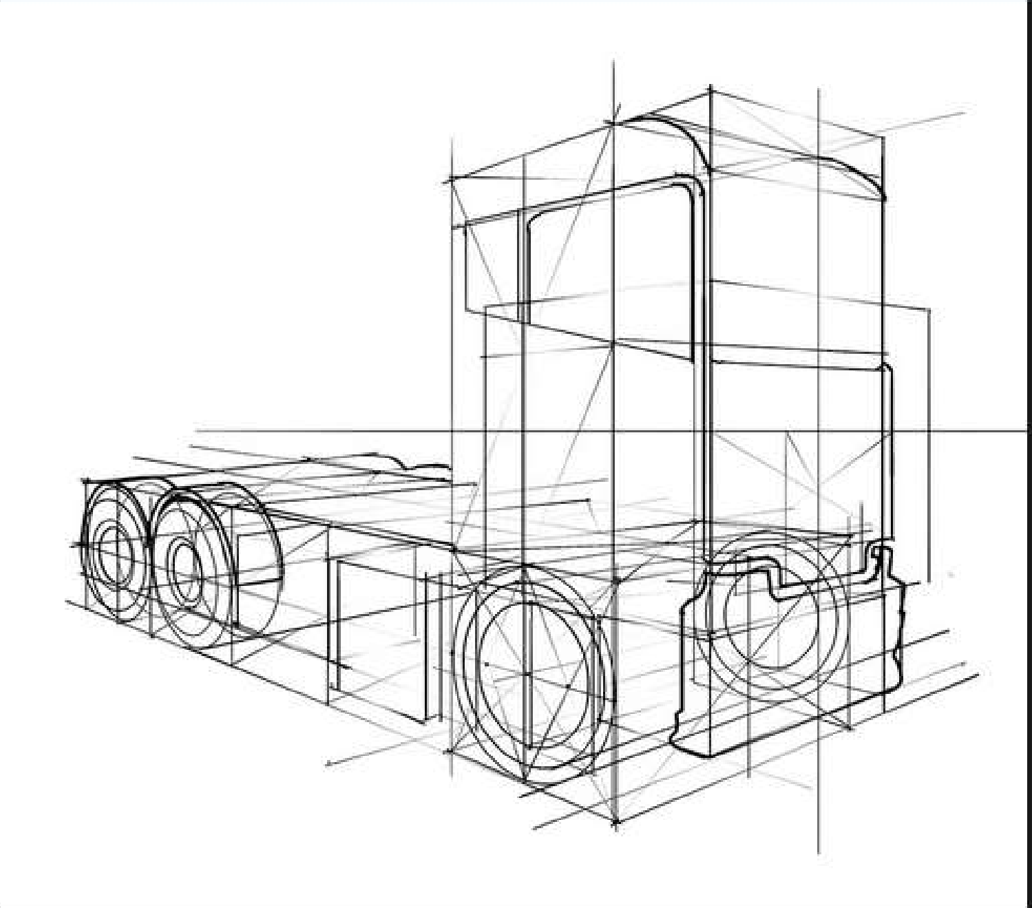


Looking at my reference, I roughly judged the distance from the front wheel to the back wheel to be roughly 5 wheels. When dealing with wheeled vehicles like this, it's extremely helpful to use those wheels as units of measurement. Since they're perfect circles, we can fairly easily understand and apply their proportions in multiple dimensions, using them for length, height, and even sometimes the width of the object.

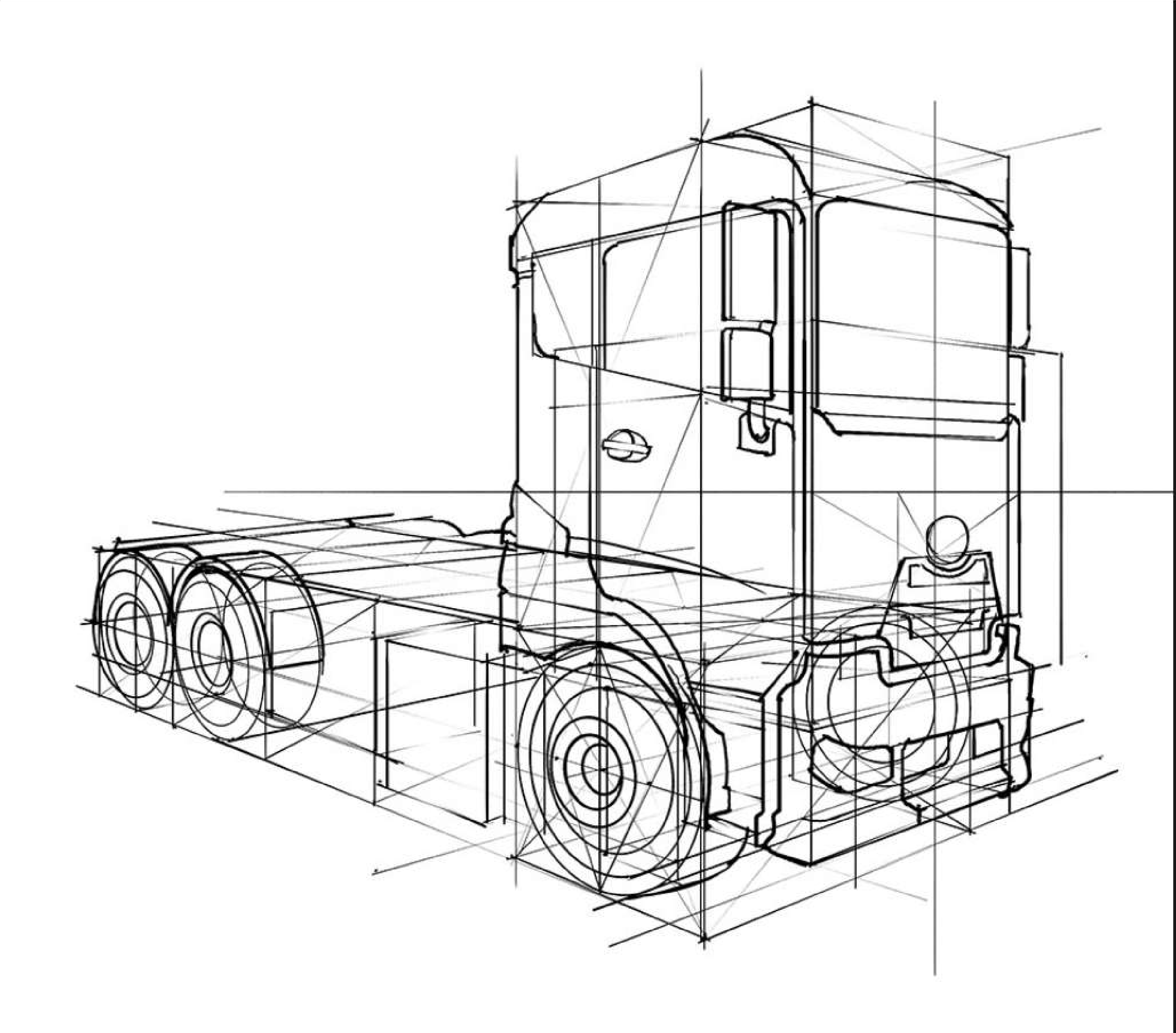
Here I've applied the technique to transfer measurements back in perspective (also described in the videos above).



Same deal - upon looking more carefully at my reference, I realized the height of my truck was way off, and that the whole thing is about 3 wheels tall. So, again, I transferred that measurement up and defined a more correct box.



At this point, most of my primary construction is done, and I can start refining those forms - that is, rounding off edges, carving more complex information, and so on. This truck's finer details were deceptively complex, and I ended up leaving a great deal alone due to its insignificance in the context of this demonstration. Honestly, I wish I'd left more of it alone, as it ended up being a bit of a rabbit hole that just kept going deeper and deeper...



More of the same. I pretty much just stopped it at this point, as it was eating up far too much of my time, and I'd already hit the major points I wanted to discuss with this demonstration.

<<< Video Lectures
Coast Guard Boat Demo >>>

Staedtler Pigment Liners

These are what I use when doing these exercises. They usually run somewhere in the middle of the price/quality range, and are often sold in sets of different line weights - remember that for the Drawabox lessons, we only really use the 0.5s, so try and find sets that sell only one size.

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Lesson 7: Applying Construction to Vehicles

Coast Guard Boat Demo

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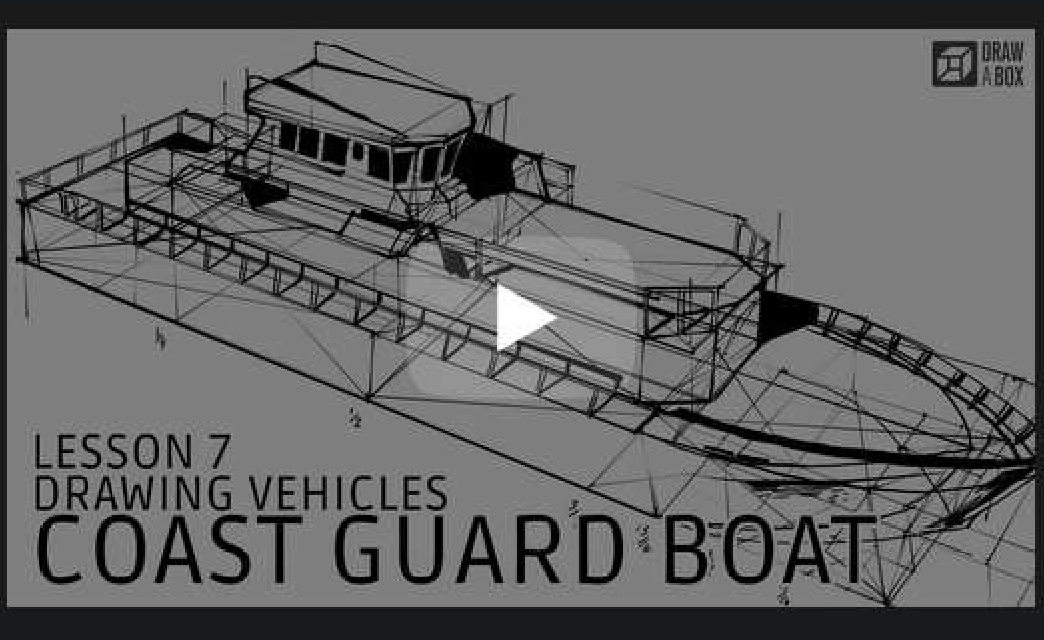
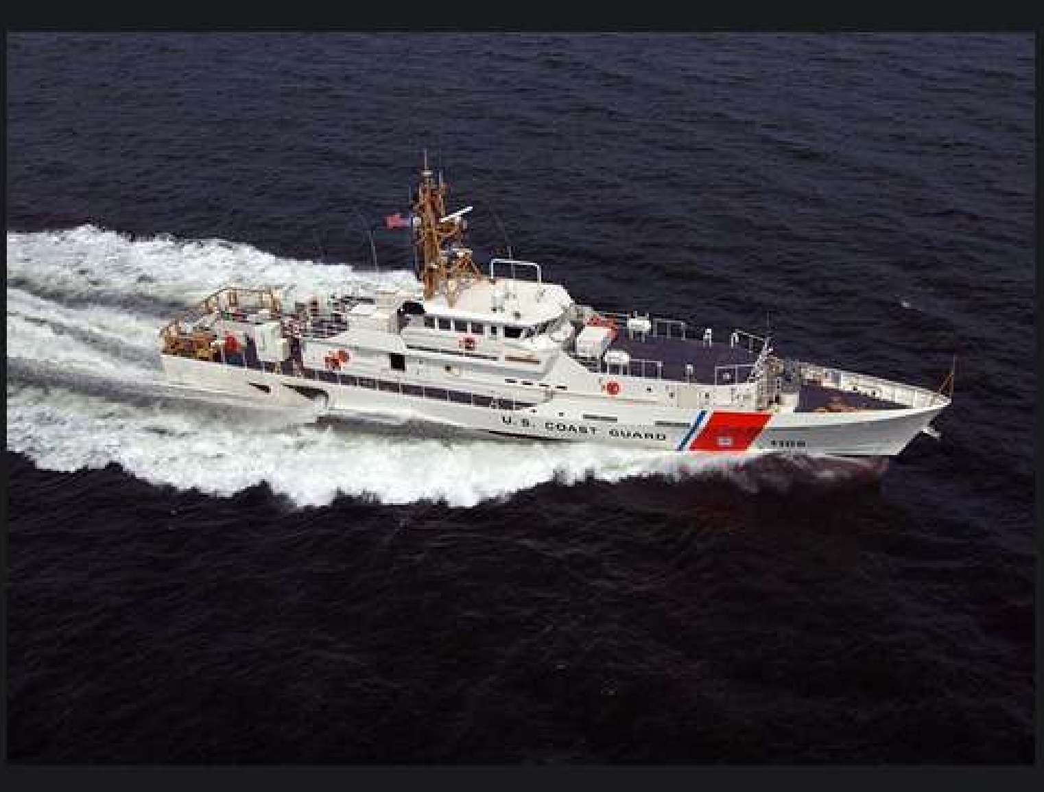


Demo Video

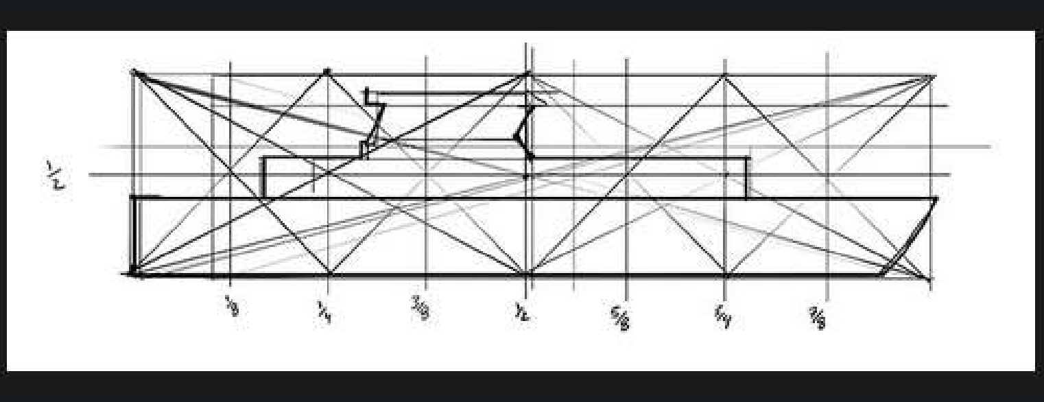
So here's an entirely different subject, though construction applies to it all the same. In a lot of ways this is quite similar to how we tackled the computer mouse in the previous lesson.

This demo recording has no accompanying audio commentary.



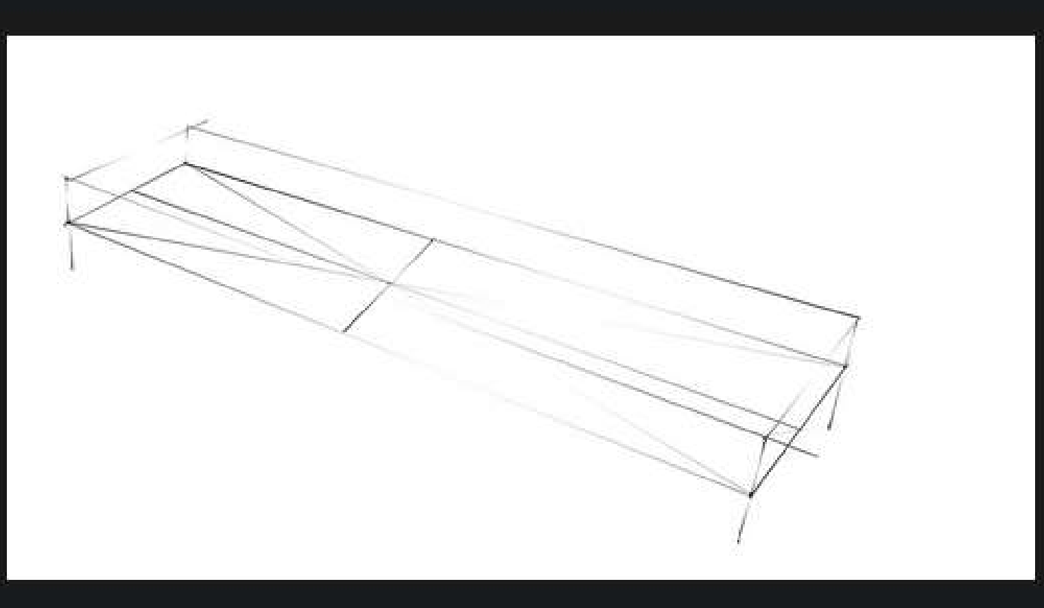
Reference

Here's the reference image we'll be working from. For the most part, all the important bits are quite visible, even though there's a lot going on.

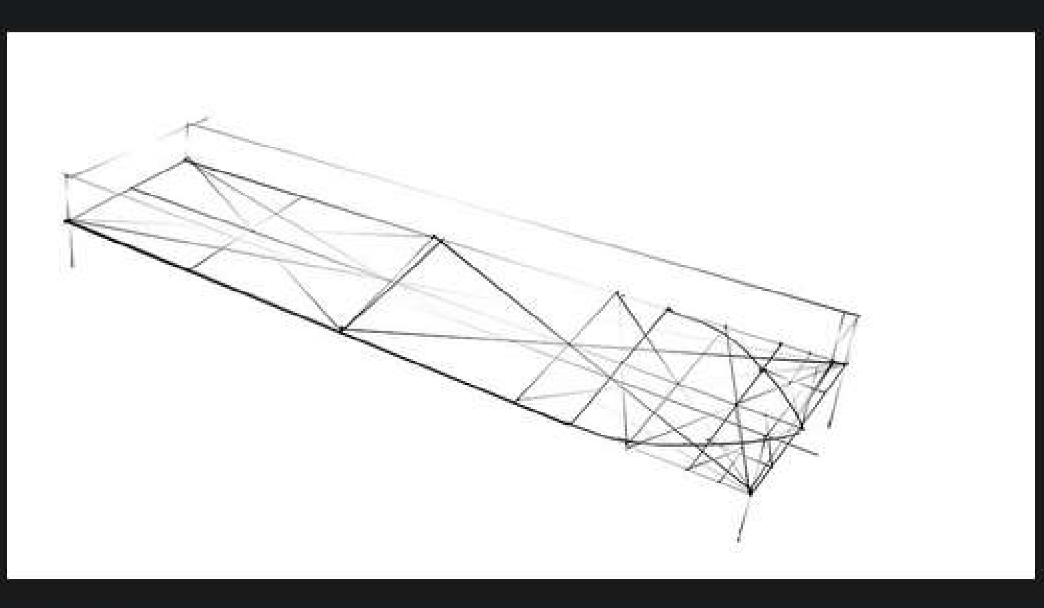


Step by step

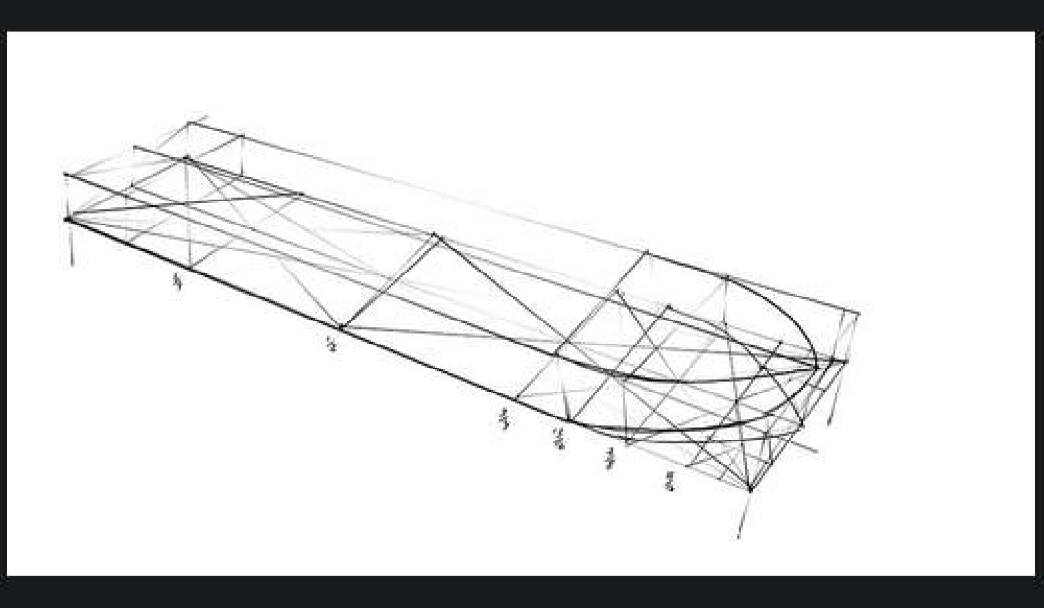
This time, let's slow down and try doing more preparatory work. By doing an orthographic proportion study, we can start to lay down basic landmarks against which we can place our major forms. I always start this off by drawing a rectangle that roughly matches the overall length and height of my subject. Then I subdivide it like crazy, creating a grid. When I actually draw the side view of the object, I try to stick to straight, clear-cut lines. I'll only use a curve when it's integral to the form I'm building, and even then I'll often start it off as straight cuts, coming back afterwards to smooth it out.



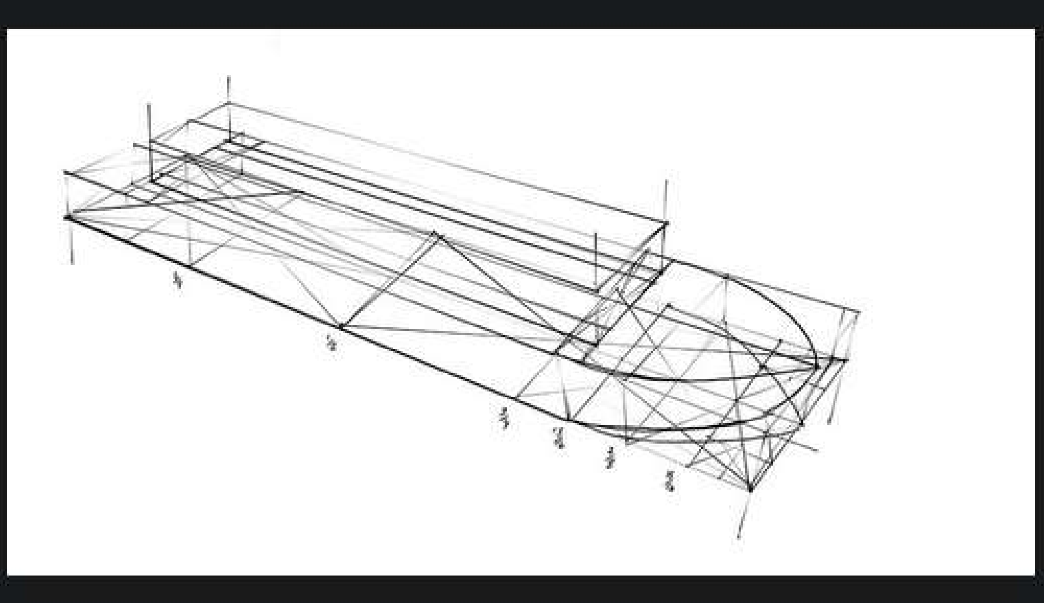
The approach I'm using here is a mixture between the encompassing-box technique I first introduced in the last lesson, and the more standard stacking of forms. I'm using the encompassing box to create sections of my object, rather than the entire thing. In this case, the section is the base of the ship.



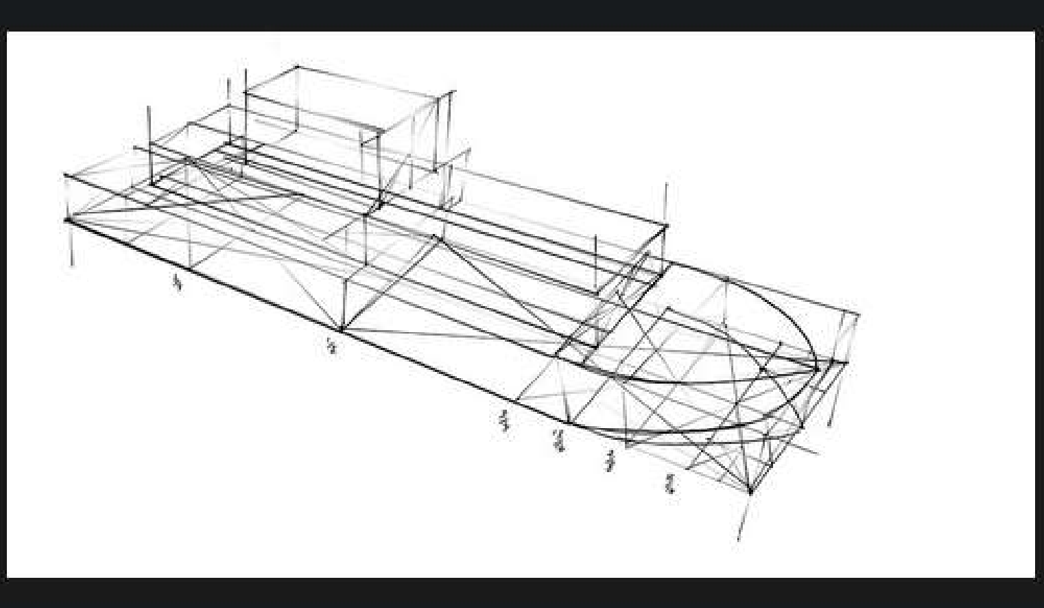
The first step I'm taking to construct the bow of the ship is to establish its curvature with a sort of footprint. In order to construct this, I further subdivide the front section of the box a fair bit, in order to give myself a finer grid to work from. The important thing here is that I want to make sure that if the curve passes through certain points on one side, the opposite side of the curve should pass through the same corresponding points. This helps maintain consistent perspective distortion, which can be tricky without any additional reference points to rely upon.



In retrospect, I probably could have created that footprint on the top face of the box, but I felt that having it on the bottom would help me relate it more easily against the actual footprint (which is slightly smaller and more tapered). Ultimately, I replicate that footprint on the top face, tuck in the base section a bit and connect them together to produce a three dimensional form.

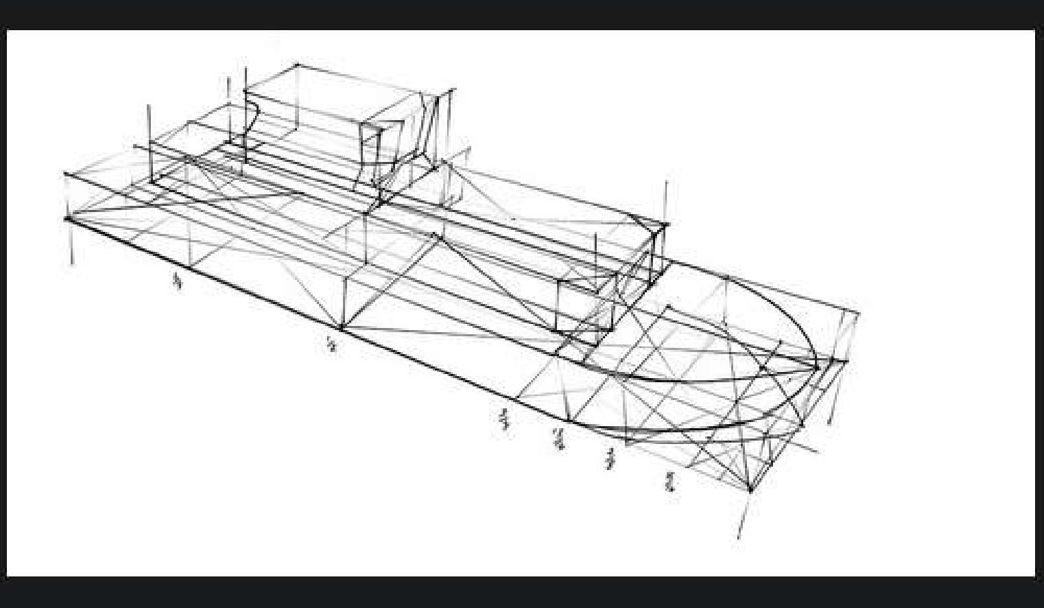


This ship has three tiers to it, so now I'm stacking on the next one. Before I do so, I want to place its footprint (which is pretty straightforward this time since it's just a box) on the existing base. In order to do this, I take a rough estimate on one side, and then mirror that measurement across the center line of the base form. Then it's just a matter of extruding that foot print up.

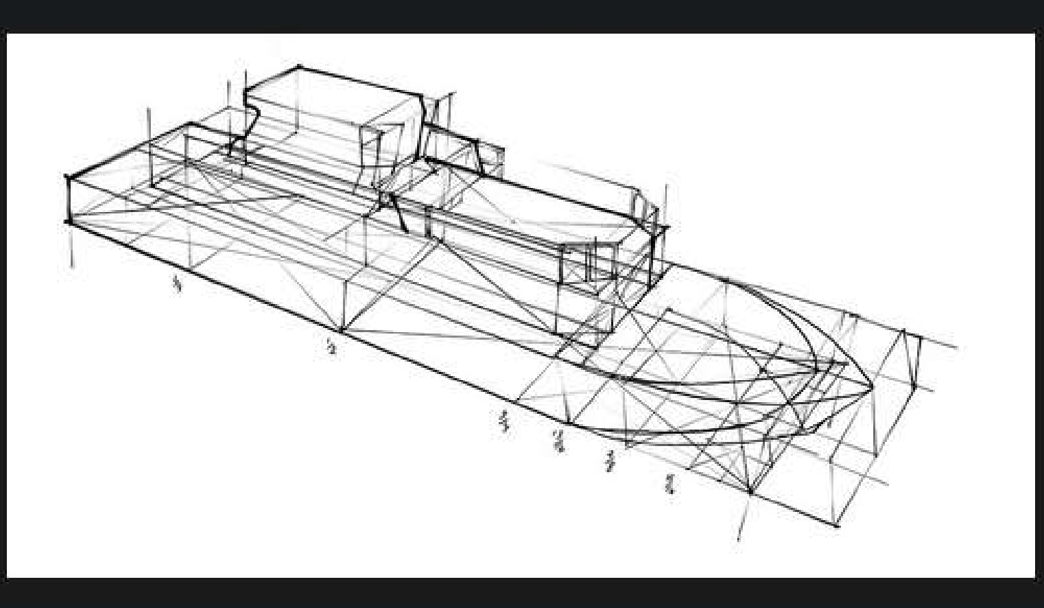


Same idea, once again. Establish the footprint, extrude the form up.

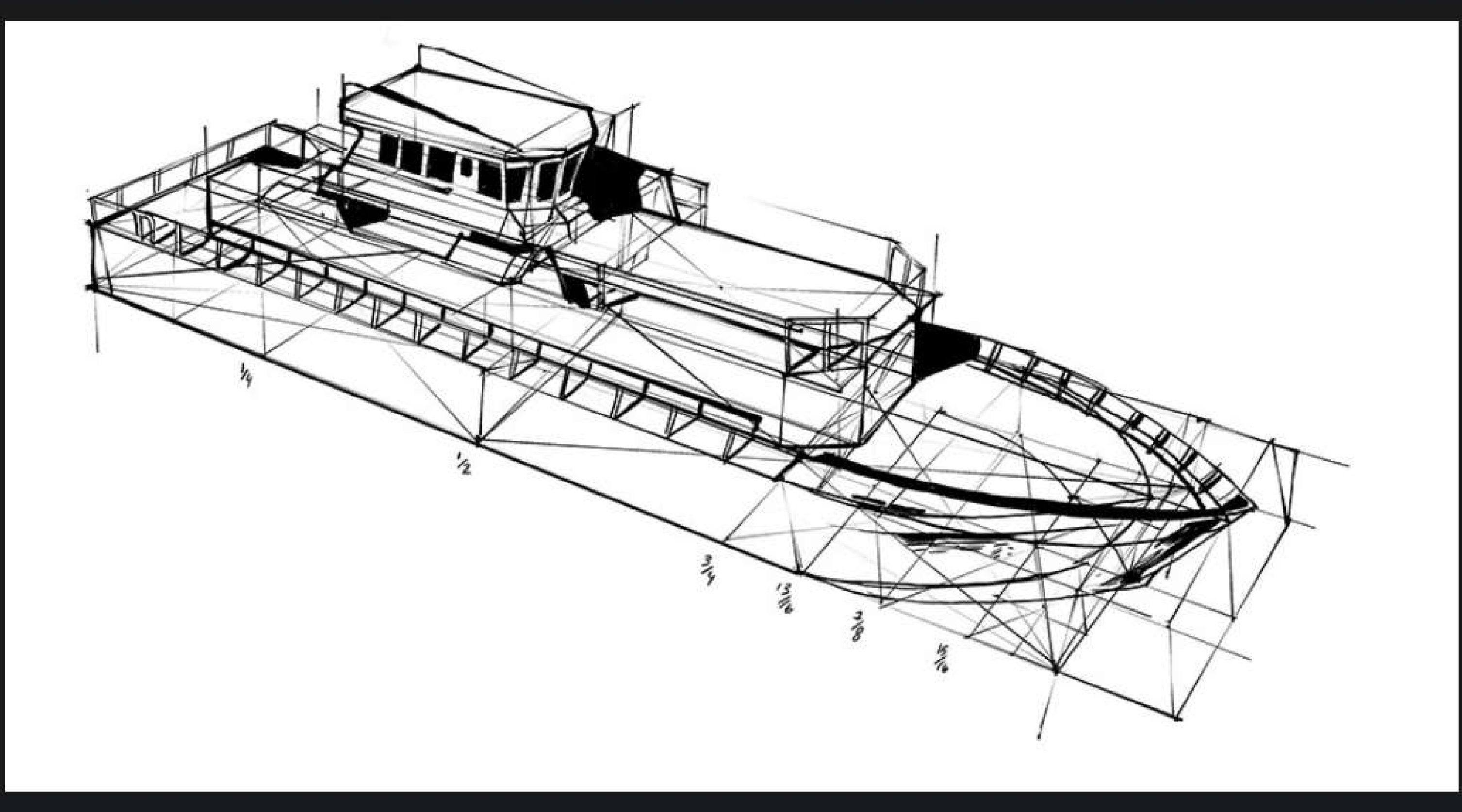
Warning: Anyone with half an eye for perspective can start to see that my lines are... well, falling apart a bit. The reason being, the angle I'm drawing this at required me to work in three point perspective, which is notoriously difficult to estimate. I strongly encourage you at this stage to focus on constructions in two point perspective. Being able to trust that your verticals are all running straight up and down is incredibly useful. If you are going to be working in three point perspective, laying down a series of lines that go off towards the same vanishing point when you start out can be incredibly useful - just make sure that they are consistent in their alignment.



As you can see in the reference image, the wheel house is a little more complex than a basic box. It's got beveled front edges, and it tapers down to its midsection before flaring back out. Deal with each of these details one at a time - probably the tapering/flaring first, then the beveling.



For the sake of time and my sanity, I'm skipping over the big structure on top of the wheel house, as well as a lot of the extraneous details. Here's the point that I want to start organizing my lines and generally sorting through my mess. The best way to do that is, of course, to add line weight to key areas. The biggest thing I want to reinforce is the overall silhouette of the object, bringing it out from the rest of the construction lines.



Continuing to do what I can to bring the meat of the boat out of the mess, while adding some minor details. One approach that I often use to help organize heavy messes like this, is to lay down some large, deliberately-designed shadow shapes. The key here is being deliberate. You have to think about how those shadows will run along surfaces, and you have to make sure the angles of projection are consistent. Basically, think about where your sun is going to be, and what direction it's going to be casting its shadows. Having a shadow come out towards your light source is a big no-no, as it'll break the illusion. Don't go too heavy with this, just place shadows in key areas, especially where it's going to help separate a key shape or form out from the fray.

<<< Cab-Over Truck Demo

1967 Shelby Mustang Demo >>>

Faber Castell PITT Artist Pens

Like the Staedtlers, these also come in a set of multiple weights - the ones we use are F. One useful thing in these sets however (if you can't find the pens individually) is that some of the sets come with a brush pen (the B size). These can be helpful in filling out big black areas.

Still, I'd recommend buying these in person if you can, at a proper art supply store. They'll generally let you buy them individually, and also test them out beforehand to weed out any duds.

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Lesson 7: Applying Construction to Vehicles

1967 Shelby Mustang Demo

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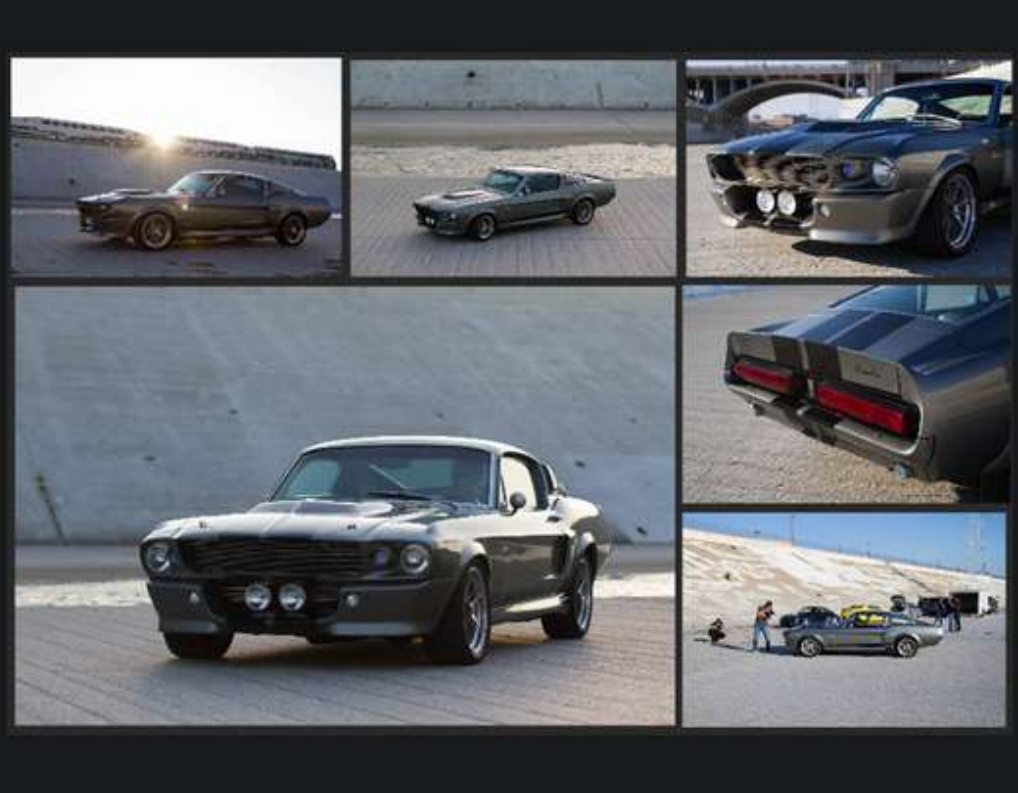
Demo Video

While there is another car demo in this set, this one is by far the most detailed and complex of the lot. It is worth mentioning that the Camaro in the next demo was done in October 2016, whereas this one is from December 2018.

It is also at this point that I truly accept that cars - especially classic muscle and sports cars - are like the **boss fight** of the RPG that is Drawabox. Here you will be applying all of the spatial awareness you've been developing over the last while as you've worked through the rest of the lessons.

To put it simply, cars are extremely difficult. They are composed of very specific curves in all three dimensions, combined to convey such a striking and precise sense of character. Similar to the concept of the "uncanny valley" when depicting or reproducing humans, there's something in us that can easily recognize that a drawing of a car is wrong - even if we can't put our finger on it.

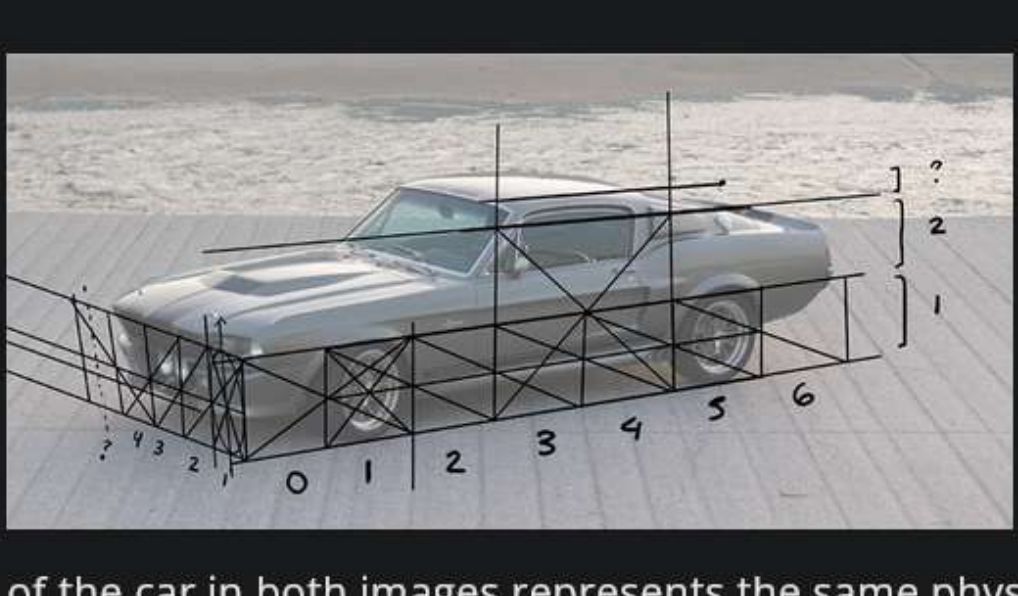
Anyway, lets get started. The demo video for this is an hour or so in length, and involves full discussion as we move through the various stages of construction. Below you'll find the major steps laid out with text description.



Reference

Here's the reference I'm using. As you can see, there are a number of different shots of the same vehicle. I was pretty lucky and found exactly the car I wanted (a 1967 Shelby Mustang GT500 Fastback, the one named "Eleanor" from Gone in 60 Seconds) with high resolution images in a blog post by West Coast Shipping.

My actual drawing will be based on the large image in the bottom left.



Proportional Study

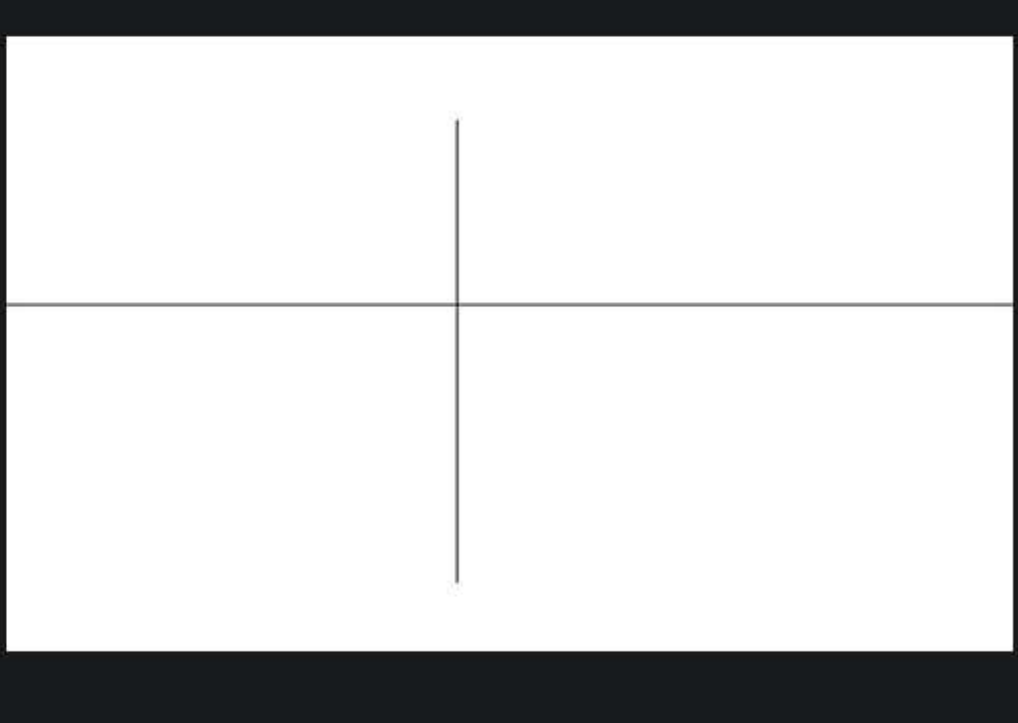
To start with, we're going to take a look at the proportions of our vehicle.

While here I've done the study from a single image at a 3/4 view to save myself some time and keep this long demonstration as short as I can, you should really do separate studies of the front and side, using the fact that the height of the car in both images represents the same physical measurement to provide a consistent comparison between the measurements in the different photographs.

I find using the wheel to be an extremely useful measuring tool. Being a circle, the plane that encompasses it will be a square, and therefore an effective scale that can be applied to all three dimensions of our vehicle.

What you see in this proportion study image is a combination of a few techniques to build a grid off the square that encompasses each wheel. Keep in mind, I do take certain liberties with approximation and guesswork, but I try to keep them limited.

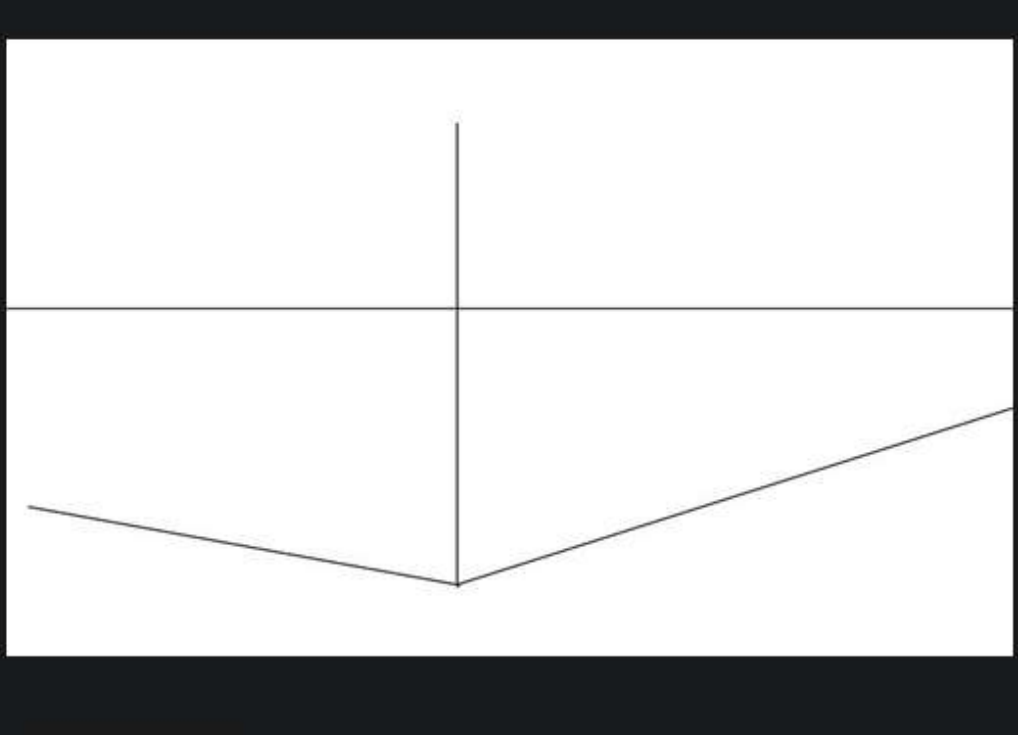
- I'm able to find the length of the car (approximately 7 wheels, mind the fact that I've actually started that count at 0 instead of 1) by simply repeating that measurement in perspective, a technique covered in lesson 6.
- The front is more difficult - I can carry the height over from the side, but in order to project that same distance in this other dimension in order to create a square, I need to apply the circle-in-plane techniques discussed as part of the cylinder challenge. Once the square is established, I repeat that measurement over.
- The height is found by repeating the unit square up once, and then adding a little extra for good measure. I assumed it to be about a quarter - this is the measurement I'll be using, though upon later reflection it was more like one eighth.



Establishing our box

To start with, I've drawn two lines on my page. The horizontal one is my horizon - while I'm not drawing explicit vanishing points, knowing where the horizon is will help me estimate their position as I'm converging lines towards them.

The other line represents a vertical edge of the box that will encompass the entire car - specifically the edge closest to the viewer.

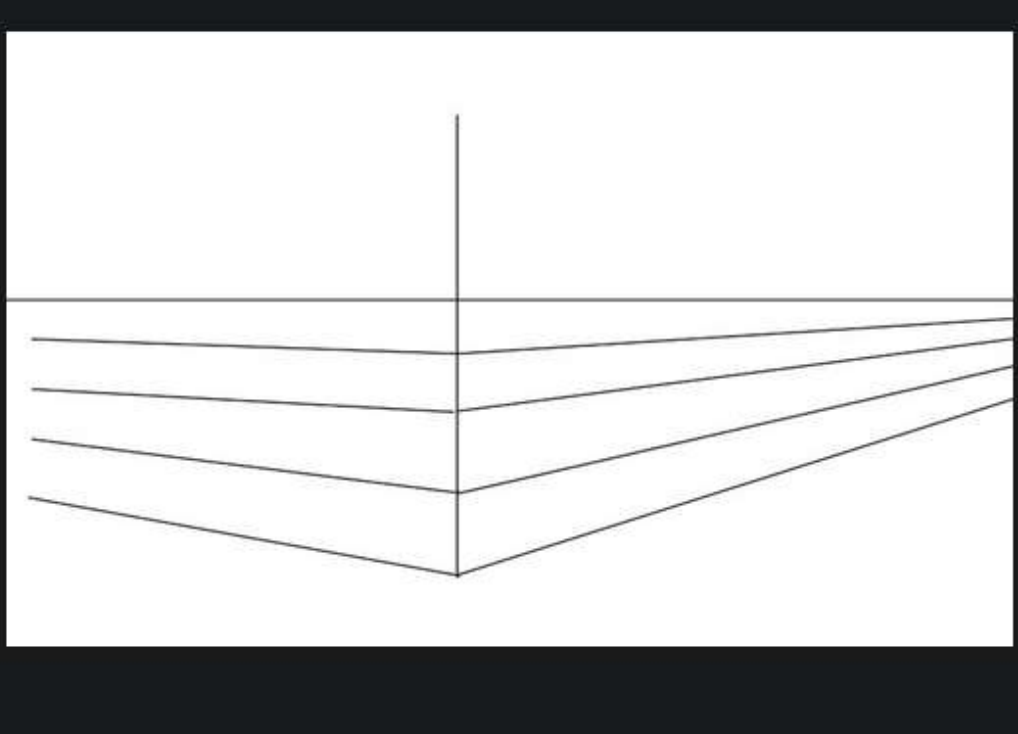


The two new lines along the bottom each establish where our encompassing box will touch the ground. Each line goes off to its own vanishing point, implying their position (based on where each line intersects with the horizon line.

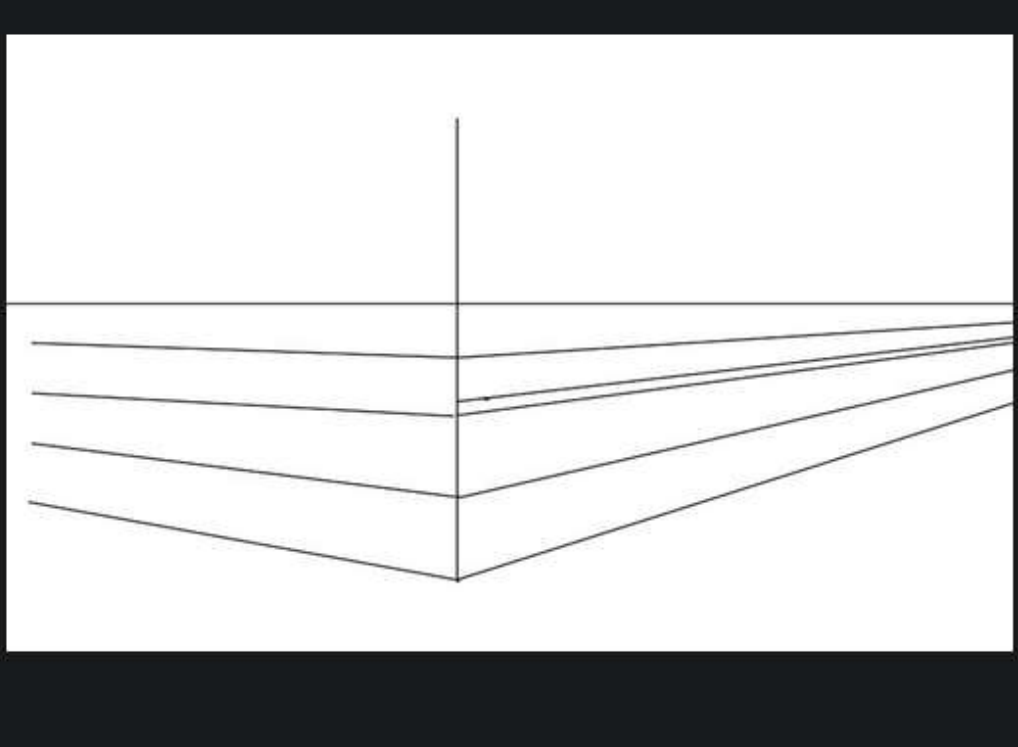
Be careful of where you "place" these vanishing points (or more specifically, where you imply them to be). If they are too far apart, you're going to end up distorting your drawing considerably.

Try and think about how they relate to this central vertical line. For example, if we were to straighten the line going off to the left to be more parallel to the horizon line (pushing that left vanishing point further out), then the front of our car is going to end up feeling stretched.

If you want to learn more about the mechanics of how to place your vanishing points, this is covered in lesson 1.

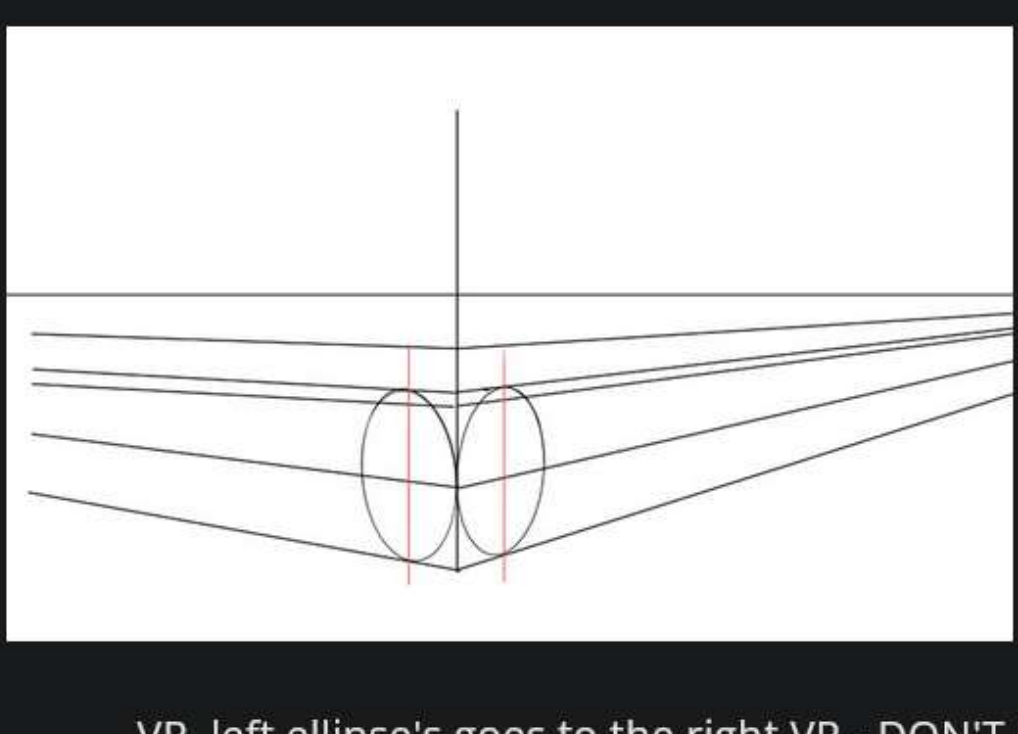


Here I've simply added more lines going off towards each vanishing point. These aren't defining a specific grid, in that they aren't a set distance apart from one another. They're just extra lines that I can reference later when attempting to eyeball a line that falls between them.



The line I've added here represents what I want to be the top of my wheel. If you look closely near the vertical line, you can see where I'd added a little dot to mark that height before drawing the full line.

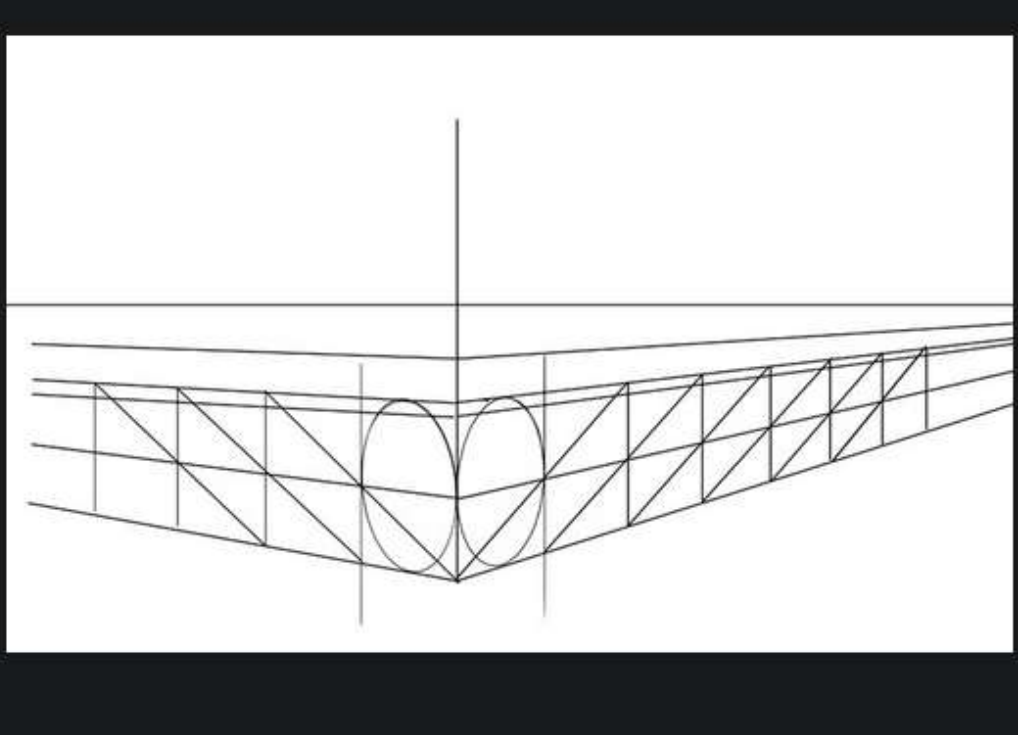
The height I've chosen for my wheel is arbitrary, but it does determine the rest of the scale for my car, since our "unit" measurement is built around the height and width of our wheels.



Next, I've drawn a line going to the left to match the height established in the previous step, and have drawn ellipses on both sides of this corner.

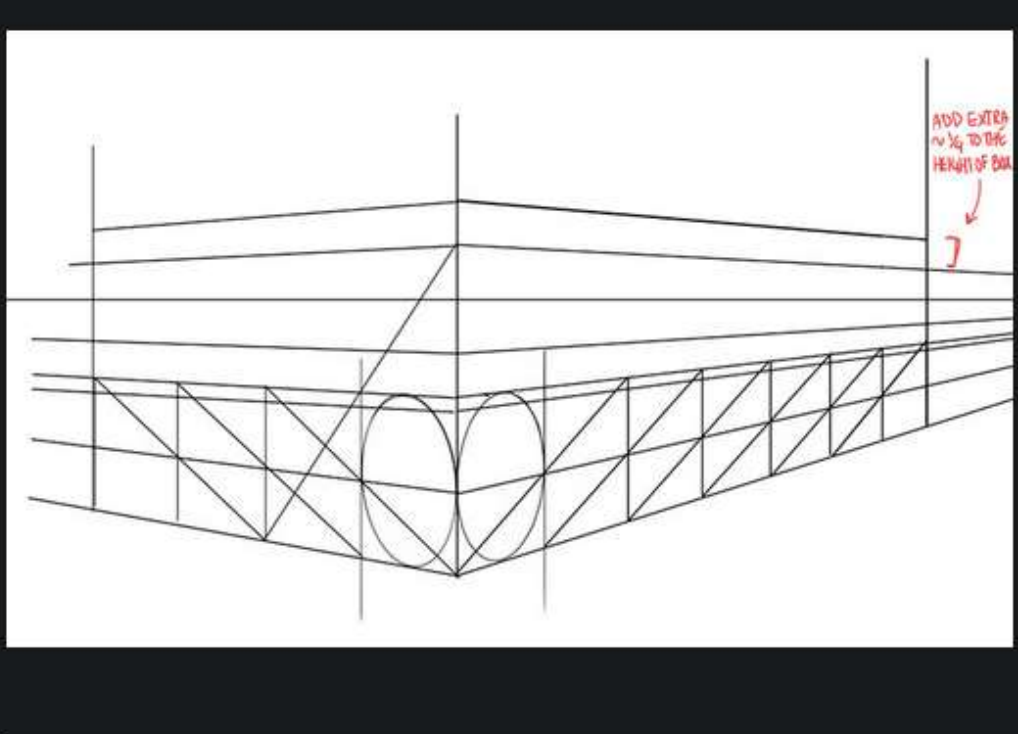
These ellipses are meant to represent circles in 3D space, and therefore they must fit the criteria discussed in the cylinder challenge:

- Minor axis must go to the appropriate vanishing point (right ellipse's goes to the left VP, left ellipse's goes to the right VP - DON'T GET THIS BACKWARDS!)
- Edges touching the top and bottom go to the opposite VP of the minor axis, setting them perpendicular to the minor axis in 3D space
- The points at which the ellipse contacts the top and bottom edges should align towards the vertical vanishing point (in this case we're working in 2 point perspective, so the vertical VP is at infinity and all our verticals run straight up and down, perpendicular to the horizon line). The red lines in this image represent the line passing through these "contact" points.

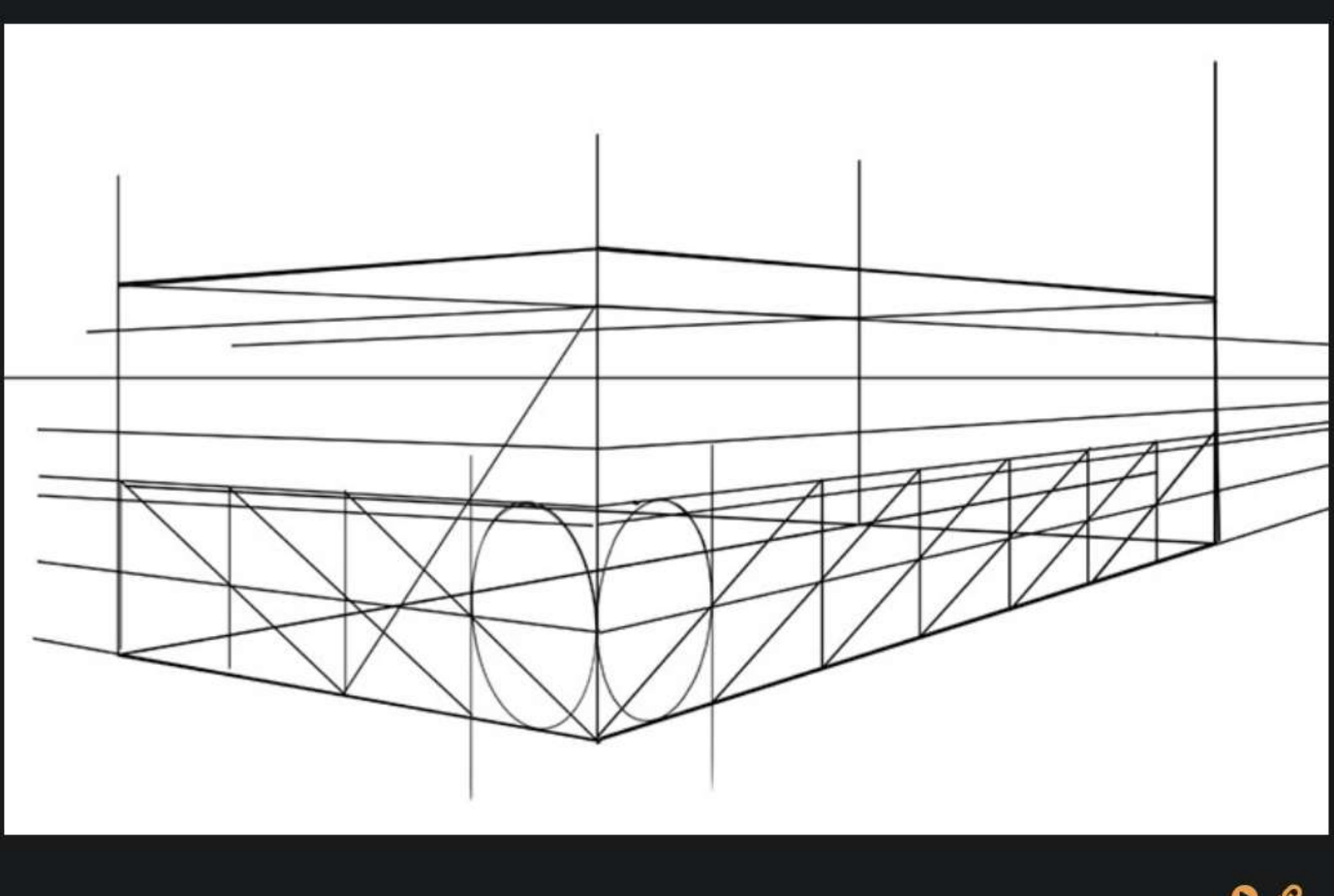


Using basic repetition of measurements in perspective, we construct a grid of 4 unit squares towards the left vanishing point (the front of the car) and 7 unit squares towards the right vanishing point (the side of the car).

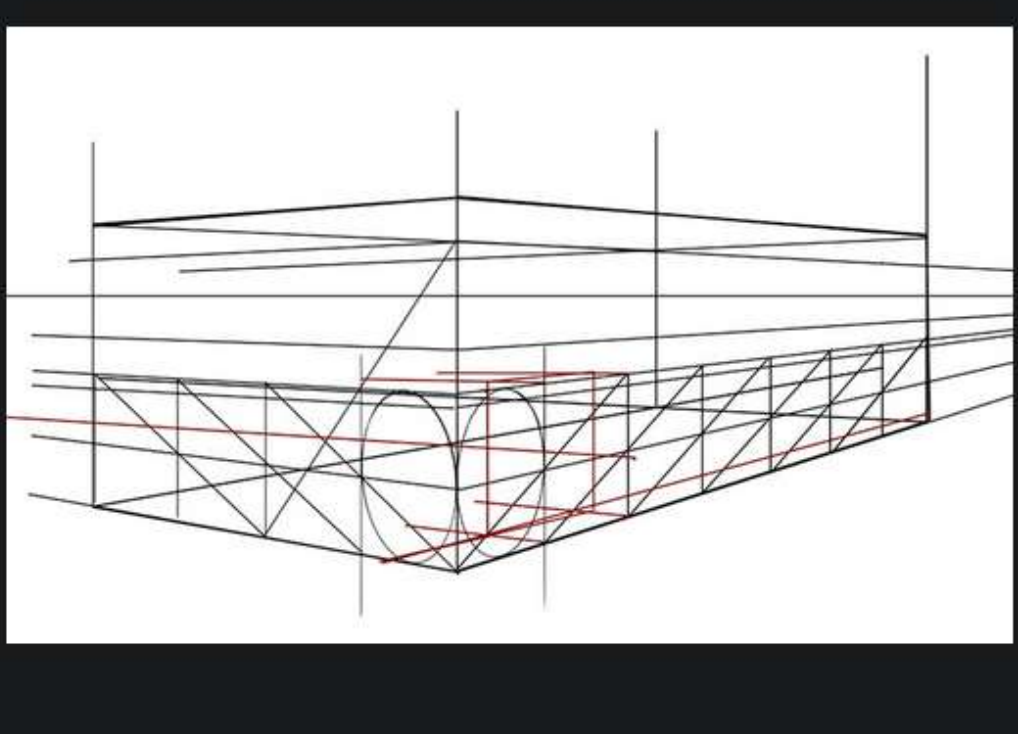
Note: The diagonals we use to repeat the wheel-plane back in space must pass through the far end of the plane at the vertical middle. This technique is explained on page 1 of this lesson.



Using the same technique, we can transfer the unit squares up once to establish a height of 2, and then add on an estimated amount for the extra quarter. You can actually be more exact with this without too much difficulty (increasing the height to 3 and then subdividing the last twice) but I didn't bother.

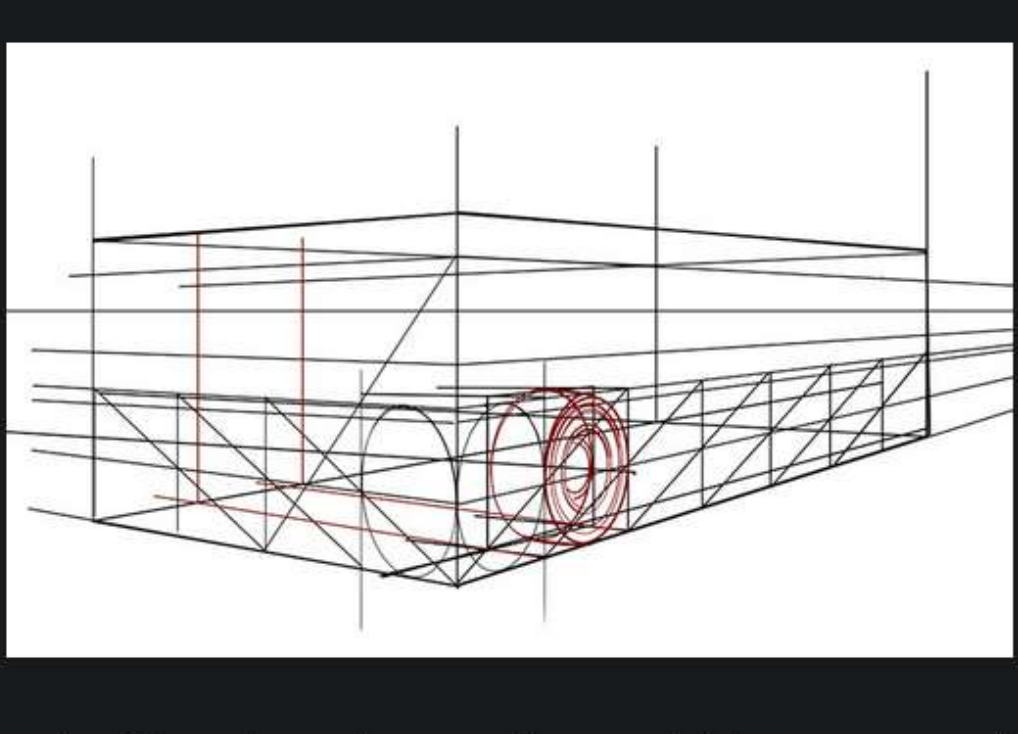


I've fleshed out the back of the box here and lightly reinforced its silhouette so I can see it a little more clearly amongst all the construction lines.



Constructing our wheels

In order to have an easier time of placing our wheels in 3D space, I'm starting out by constructing a box where I want my front wheel to go. I've also established a minor axis, converging towards the left vanishing point.

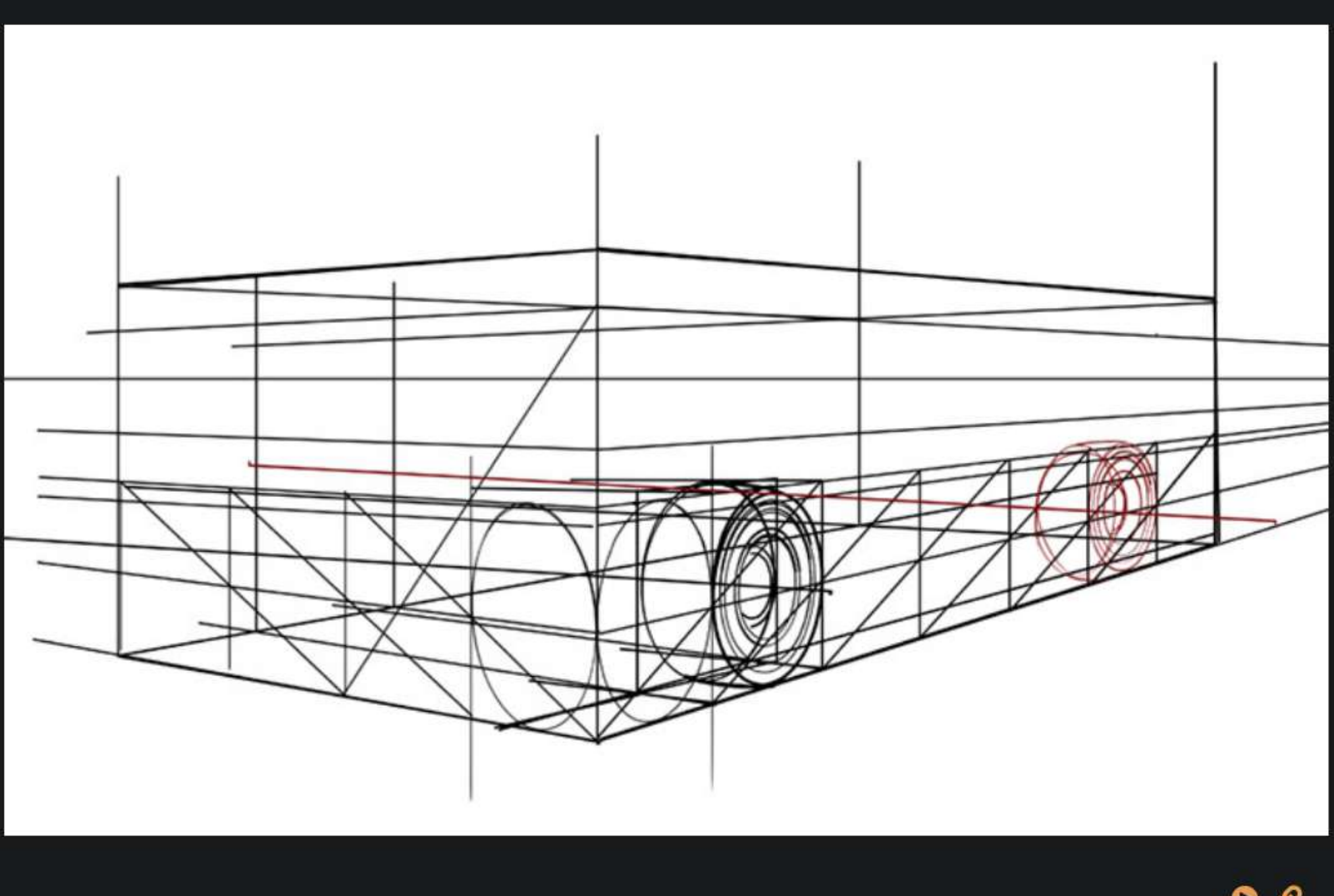


Next I draw a cylinder in that box, applying what we've learned from the 250 cylinder challenge. I did include a bunch of inset ellipses within the one facing us, along with a few that are recessed to create the illusion of a wheel.

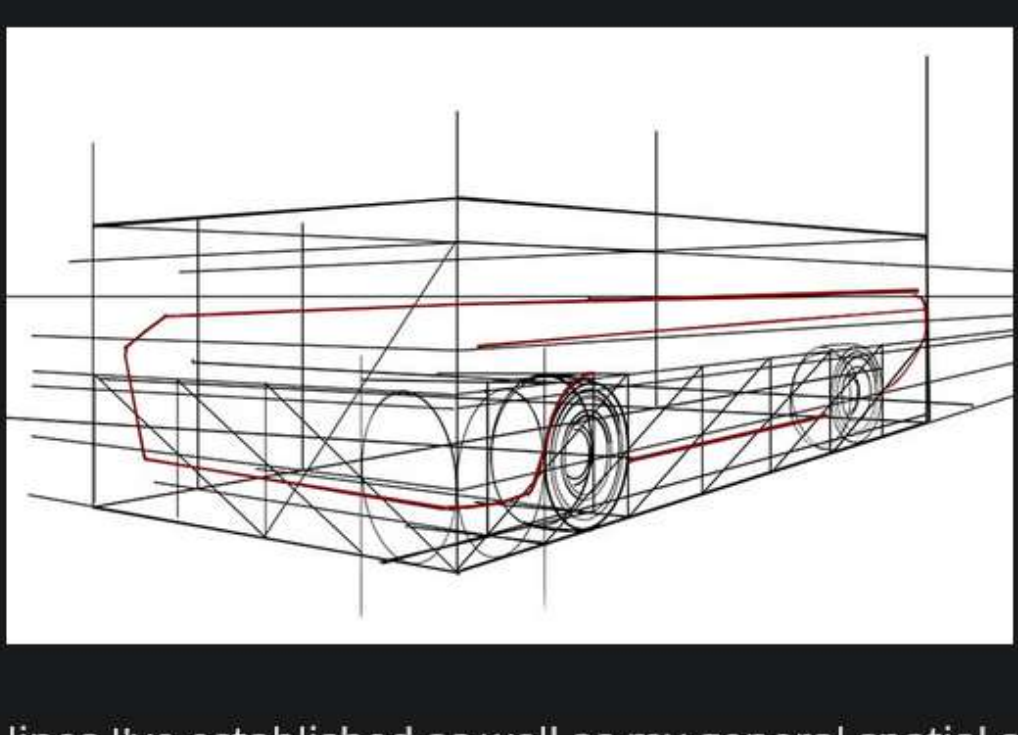
You don't need to do this just now - I mainly did it because with the digital tool I was using to draw my ellipses, it's not particularly easy to line it up again. To this end, I would recommend noting down the degrees of ellipses you're using (if you're using an ellipse guide), so you can find them again quickly later on.

Also worth noticing - my 'cylinder' isn't actually perfectly cylindrical. The edges along its length flare out, a bit like a bubble. If you're not sure why, then you probably haven't completed the 25 wheel challenge - one of the prerequisites for this lesson.

I also extend the bottom lines of the enclosing box I constructed in the previous step to the opposite side so I'd at least know where the other wheel was going to sit, even if I wasn't necessarily going to draw it.



Repeat the same for the back wheel.

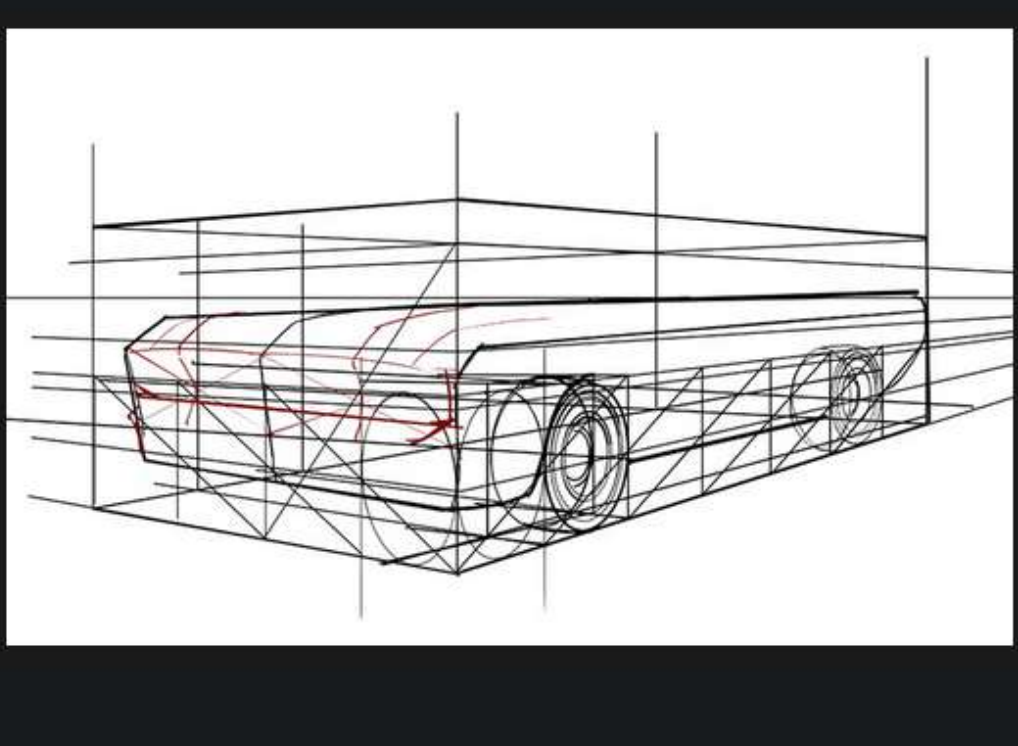


The hard part

You may feel that up til now things have been difficult - after all, cylinders are anything but easy, and there's been a lot of perspective to handle. In truth however, that's been the *tedious* part. Now things are really getting hard.

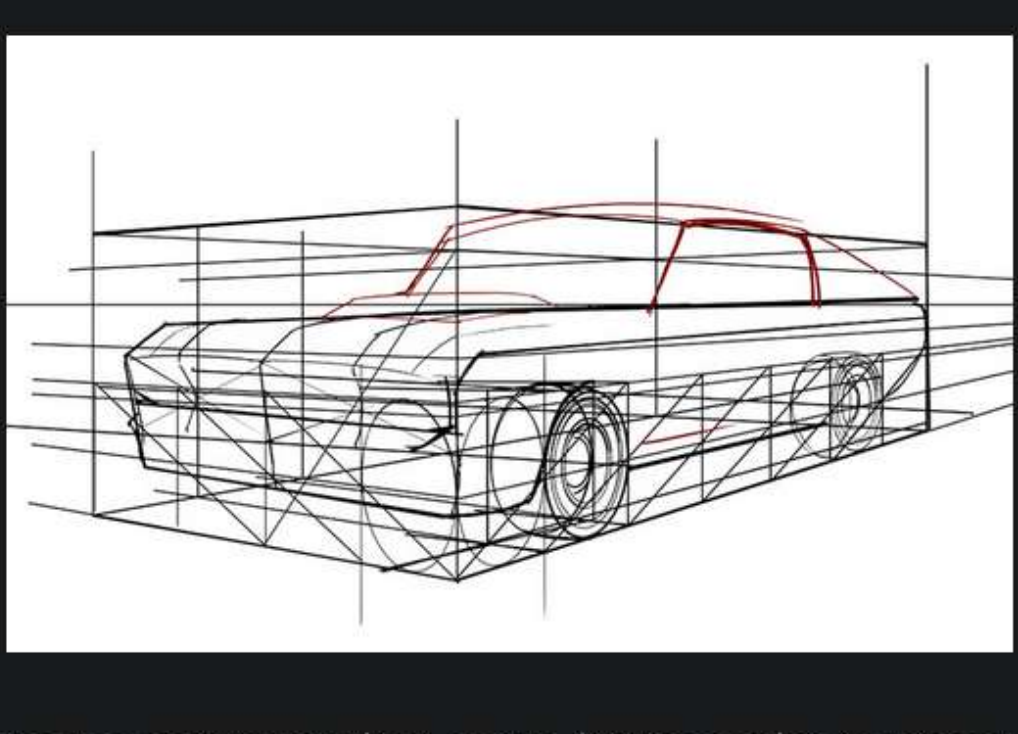
I'm going to try and keep my construction here as broken down as I can, but you will find that I'm not going to be constructing everything with forms as simple as I usually do. Instead, I'm leveraging the enclosing box and perspective lines I've established as well as my general spatial awareness (which you'll hopefully have developed while working through the rest of the lessons - which is why this topic is the last lesson of the curriculum) to build forms that are solid, but somewhat more complex and nuanced than we're used to.

What I've added here is the chassis. It's still pretty simple, but I'm showing some awareness for how the form swoops up towards the back and slants downwards towards the front. **Studying your reference carefully is a must.** Cars are full of all kinds of subtle shifts in form that you're simply not going to pick up on at first, but the only way you'll learn to do so is to really *look*.



I'm using some contour lines along the hood to reinforce how it slants down towards the front. I'm also subdividing the space where the headlights and grille will eventually go.

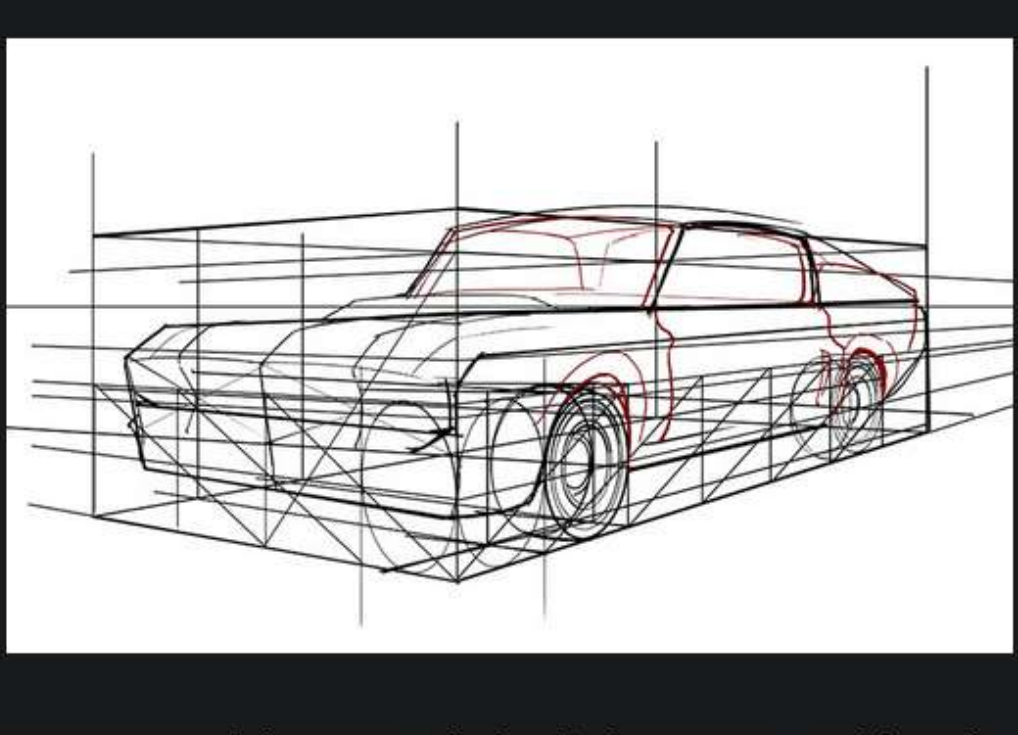
I'm not going to jump too deep just yet however - I don't want to get too caught up in any one part just yet. I'm still trying to tackle it big-picture style, hammering out all of the car, little by little, only gradually getting into more specific details.



Pushing back, I've captured the hood scoop as well as the cabin.

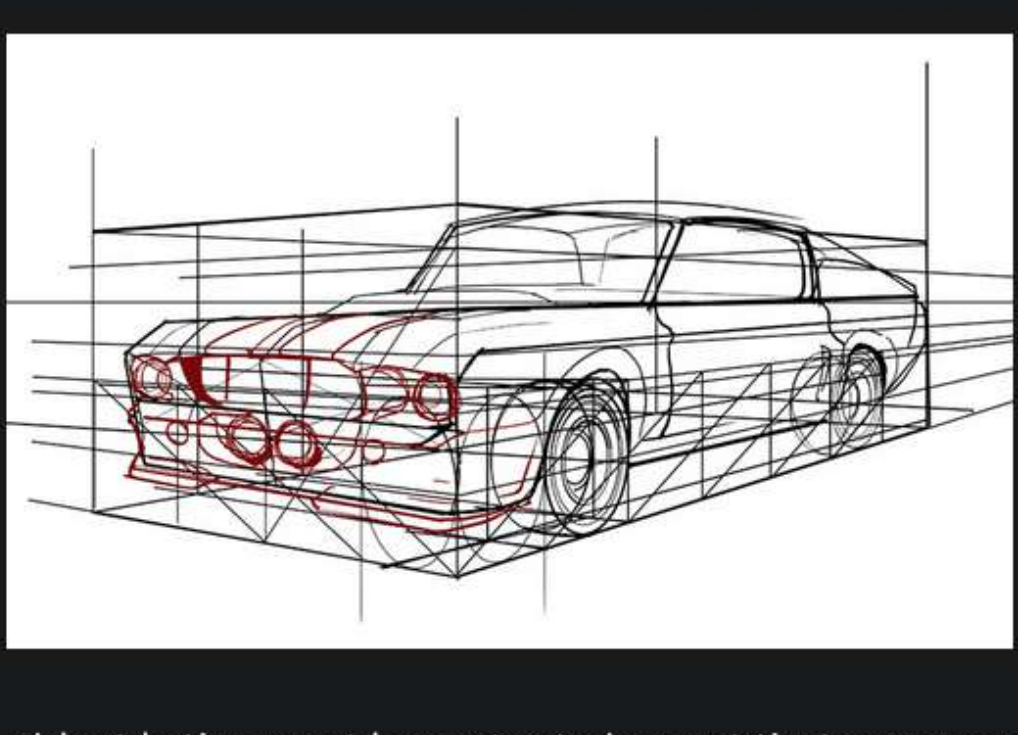
You may notice that I haven't put much into the hood scoop in the middle, despite it being a somewhat significant form as far as the whole construction goes. This is because I would generally advise you not to work strictly from front to back, or back to front. Don't push in one direction - instead, establish everything on one end, then jump to the opposite end. Once you've got that nailed down, it'll be easier to place whatever falls in between in relation to two points of reference, rather than letting your positioning errors accumulate as you go.

It's a lot like when you try and write out a title nice and neat, but because you're working from left to right, you end up underestimating the amount of space you're going to need and run out of room. The better way to approach it is to place your first and last letters, split up the space in between and allot them accordingly to the remaining characters.



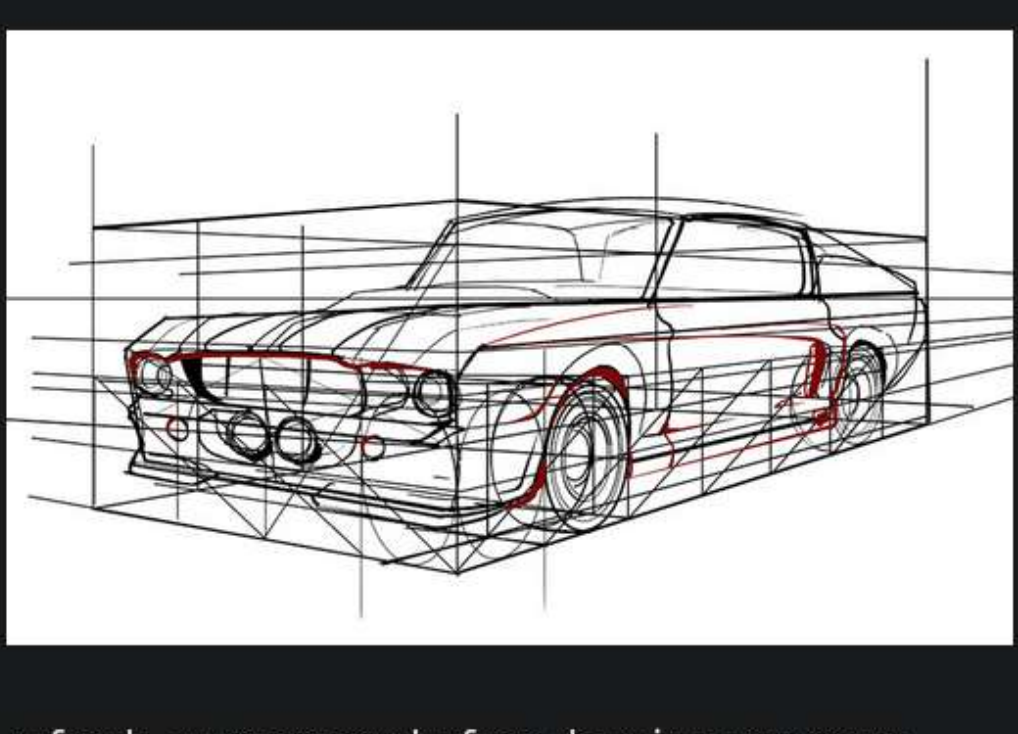
I haven't forgotten about the opposite side of the car - you'll see that I've blocked in the far corner of the interior/cabin to maintain my awareness of what's going on over there.

I've also added my wheel well detail, and have paid special attention to the contour/cut lines coming down the side of the driver's door. Again - observe your reference carefully. These surfaces are designed to a very particular specification, and you need to sharpen your senses to pick up on all the little curves and bends and twists and turns.



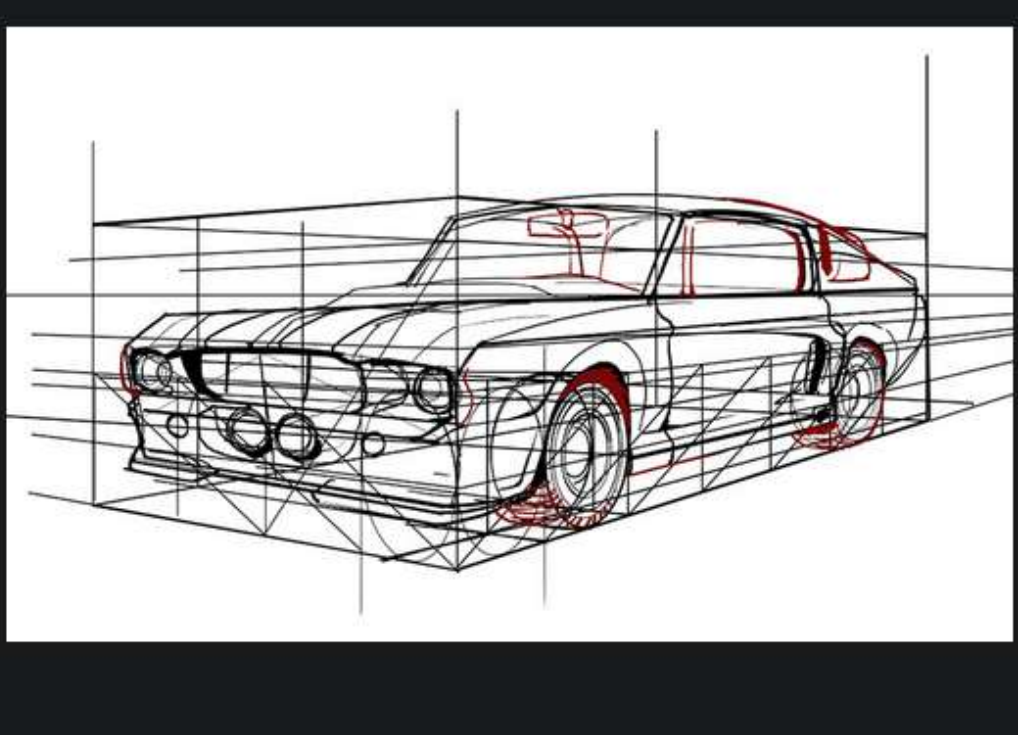
Now we're back towards the front. Using the subdivision lines I put down before, I'm starting to flesh out more of the complex curves and structure. Try to identify major landmarks and separate things out. I've immediately separated the grille from where the headlights sit, for instance.

In addition to this, don't ignore the silhouette. Any feature that breaks up the silhouette is going to be critical, as the silhouette of an object is the most important element that conveys its character. Here I've made a particular point to flare out the bumper.

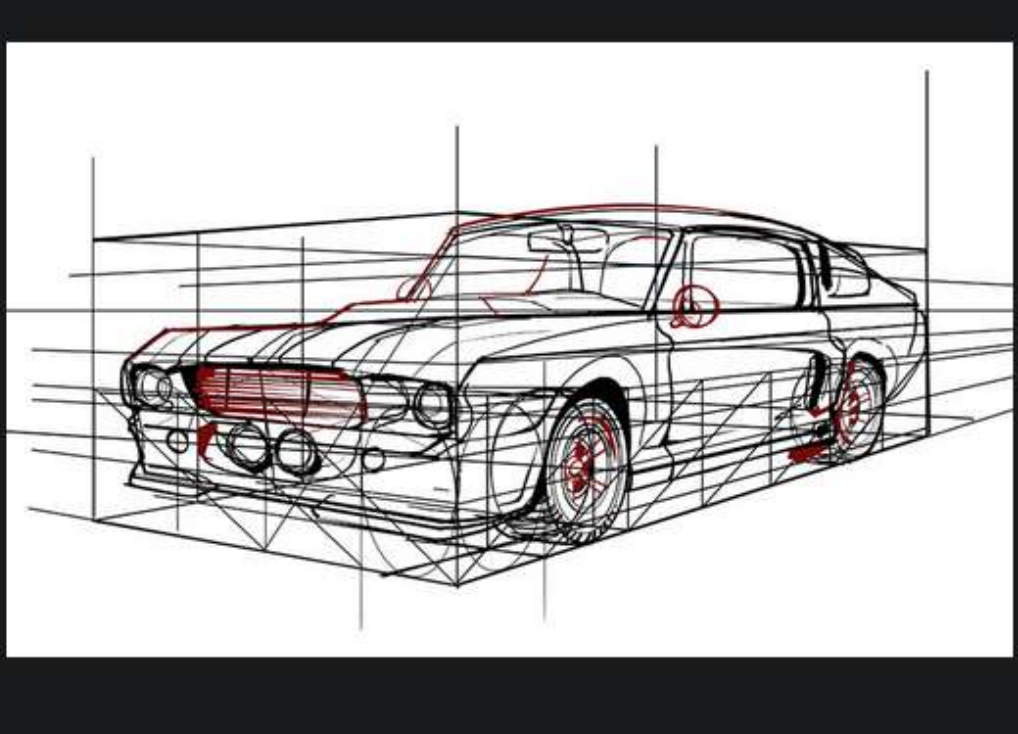


At this point I'm only including the rest of these images for the sake of showing a steady progression, rather than dumping "draw the rest of the owl" on you. It's all just elements I've identified from my reference images that I'm dropping in, bit by bit.

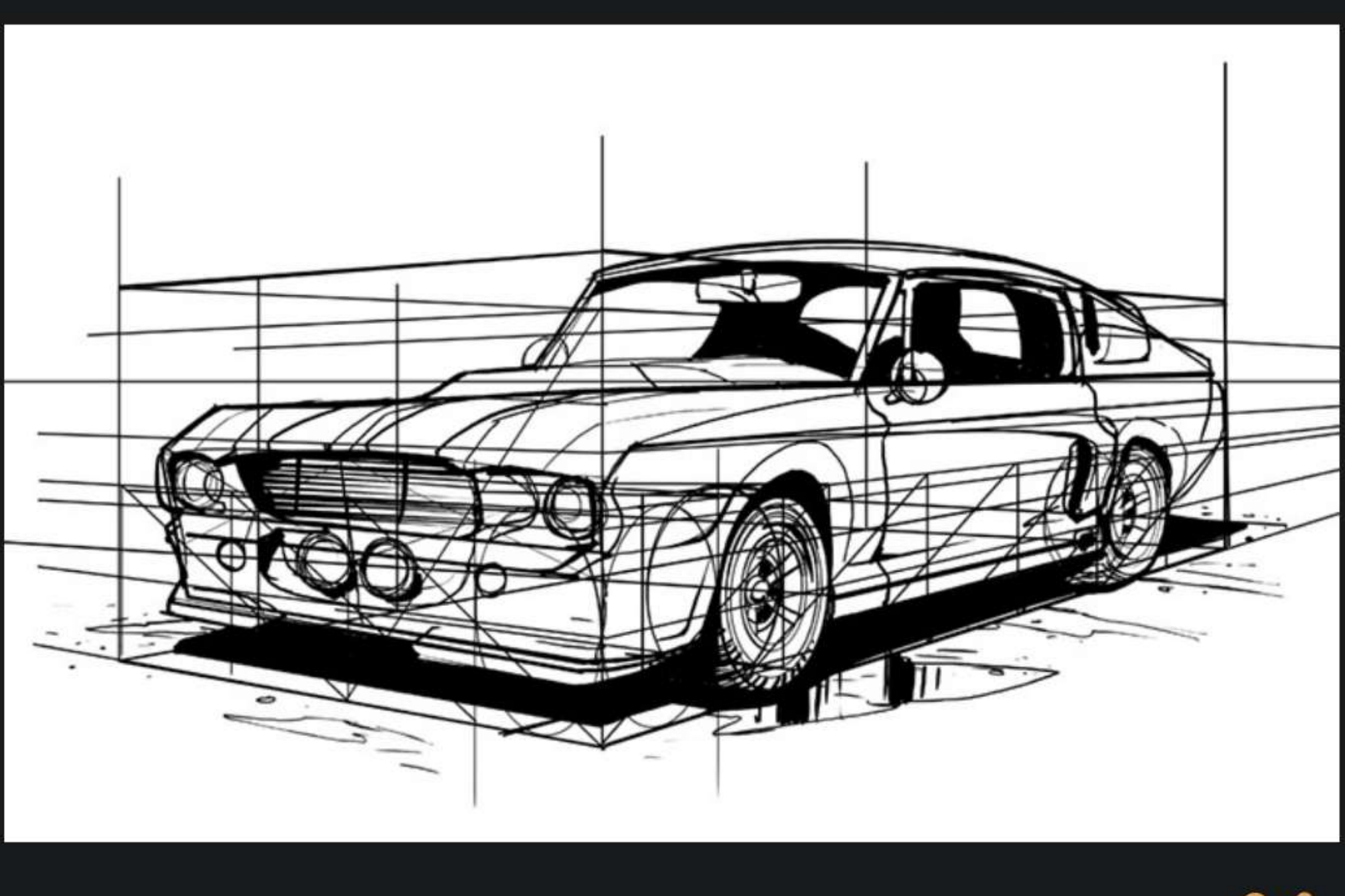
I'm spending the majority of my time studying my reference, and whenever I pick out a specific element that I want to carry over, I'll transfer it a few lines at a time, always going back to refresh my memory before drawing any more.



I'm starting to get a little bolder as I reach my finishing point. I'll drop in some stronger black areas (which currently look a bit strange because they're highlighted in red). I'm more willing to commit now - not that I wasn't committed to the strokes I was putting down before, but I was ready to face the accumulation of mistakes I'd been making til now, and having to quickly pivot or adjust accordingly.



Please don't forget your rear view mirrors - they're an important part of a street legal motor vehicle.



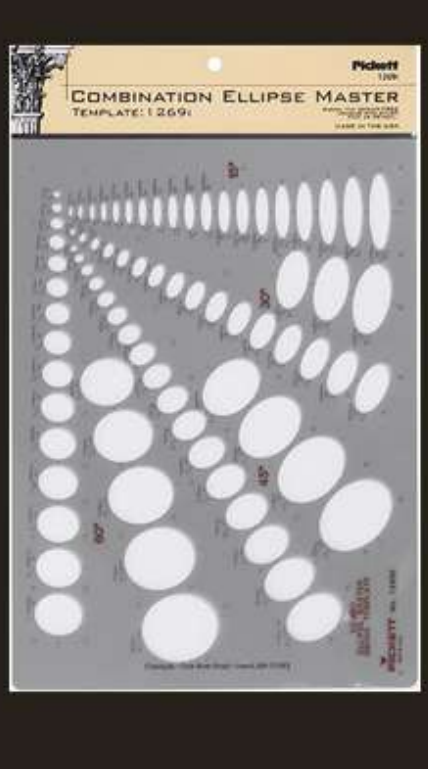
The last thing here is to put down a nice, solid cast shadow. I'll always draw these as an outline first, before deciding whether or not I want to fill it in. In this case, I decided to go ahead and fill it with a solid black to make the rest of the car pop (when working in ink, you may want to use a brush pen for this - just be careful not to let it go outside your set outline).

I've also put down a little bit of detail - nothing rushed, but nothing particularly distracting - to the ground to help make the drawing feel more natural. Lastly, I leveraged a puddle near the front wheel as an opportunity to put a few more solid blacks to balance out my overall composition.

As I said when we started, if your construction went catastrophically wrong, that's not surprising. This is a complicated task, with many layers of construction and a significant amount of dependence on the skills you've developed through these lessons. It's no longer all about putting each and every simple form down on the page - due to its complexity you're forced to rely more and more on your mental model of 3D space, your ability to visualize or at least understand how those forms interact with one another, and your ability to pivot in response to problems and mistakes that may come up.

I'd recommend that before you attempt a car like this, start with something more like an old vehicle from the 1920s, like the Ford Model T, or even a boxy Volvo from the 70s or 80s. It's not a simple one by any stretch, but it is going to lend itself a little better to bridging the gap between what we've tackled so far and more modern cars.

<<< Coast Guard Boat Demo
1967 Chevy Camaro Demo >>>



Ellipse Master Template

This recommendation is really just for those of you who've reached lesson 6 and onwards.

I haven't found the actual brand you buy to matter much, so you may want to shop around. This one is a "master" template, which will give you a broad range of ellipse degrees and sizes (this one ranges between 0.25 inches and 1.5 inches), and is a good place to start. You may end up finding that this range limits the kinds of ellipses you draw, forcing you to work within those bounds, but it may still be worth it as full sets of ellipse guides can run you quite a bit more, simply due to the sizes and degrees that need to be covered.

No matter which brand of ellipse guide you decide to pick up, make sure they have little markings for the minor axes.

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- Airplane construction

Lesson 7: Applying Construction to Vehicles

1967 Chevy Camaro Demo

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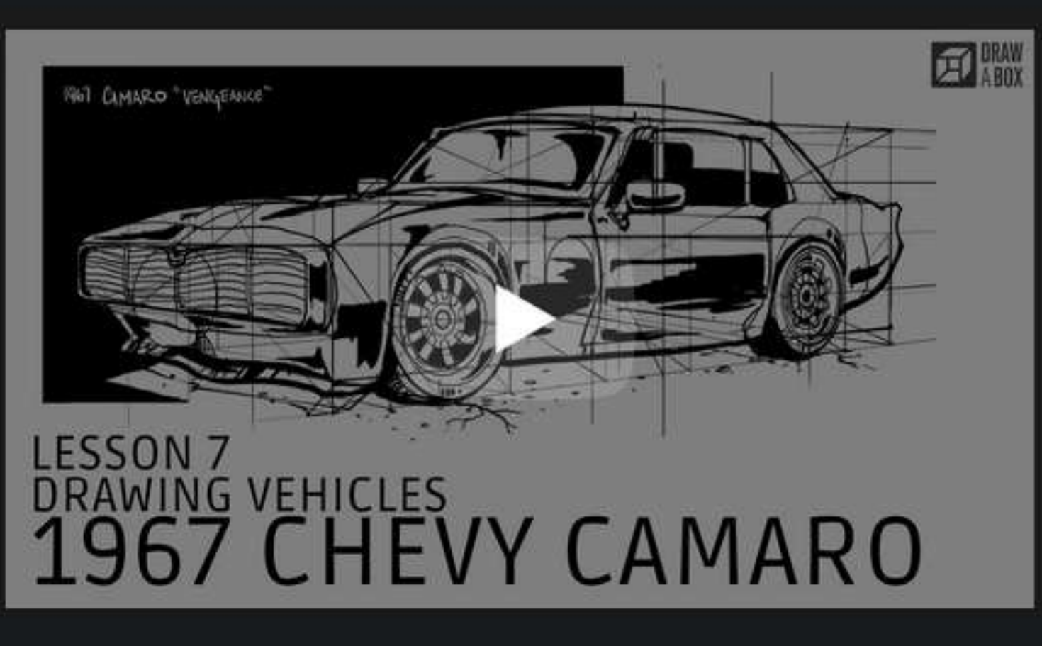
This demo is a little older, having been published in October 2016. As such, while I have decided that there is still something of value here, any techniques or approaches outlined in demonstrations not flagged with this message should be considered to take precedence over what is covered here. This is a natural part of Drawabox being an evolving, growing resource.



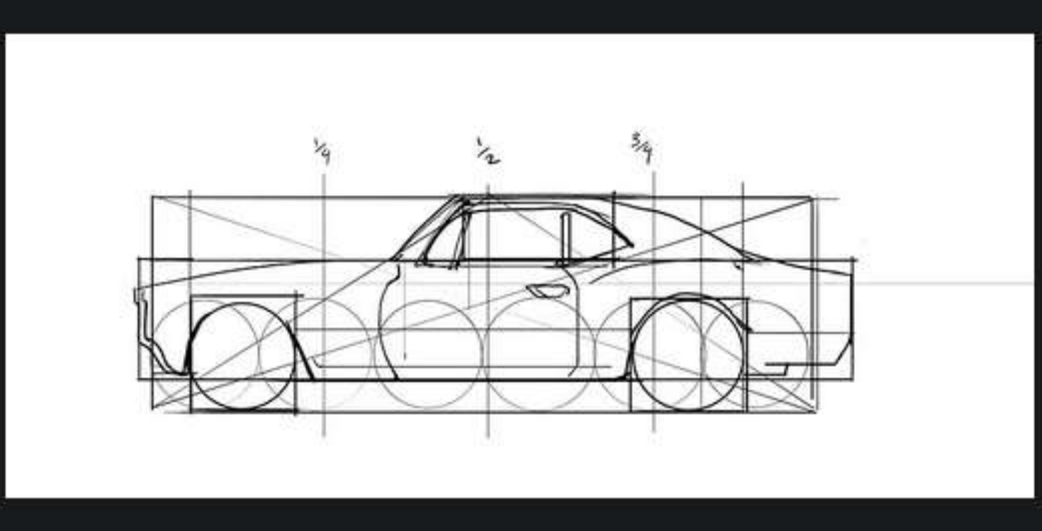
Demo Video

I love cars, but I hate drawing them. The thing about cars is that they all have very specific proportions to them, very specific curves, very specific **form language**. It's very easy to stray ever so slightly, and people will notice. That said, the technique applied to the computer mouse in the last lesson is pretty effective for this sort of thing.

This demo recording has no accompanying audio commentary.

Reference

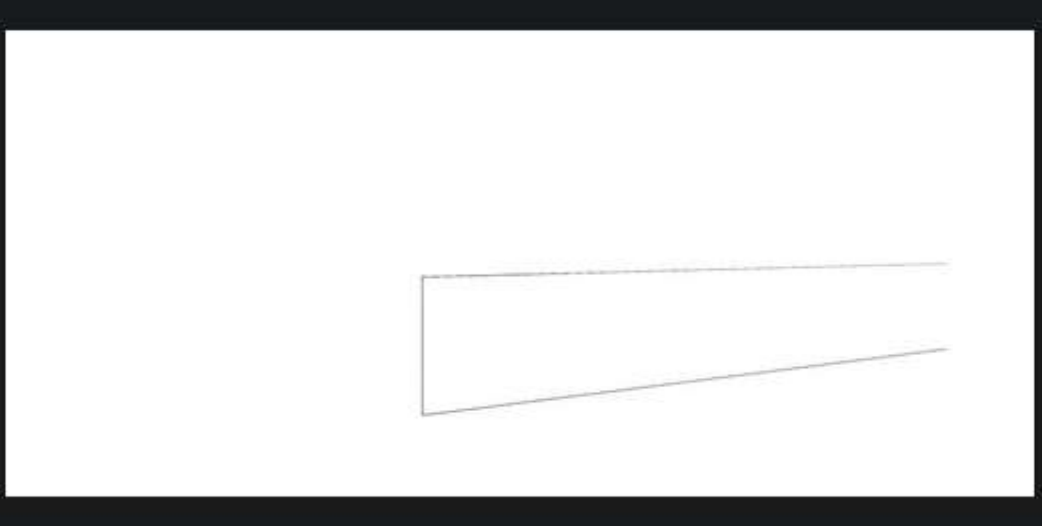
Oh, notice how I'm using two reference images here? There's no reason you should ever stick to just one, and with cars it's ridiculously easy to find all kinds of angles, especially side views. These make proportion studies a breeze.



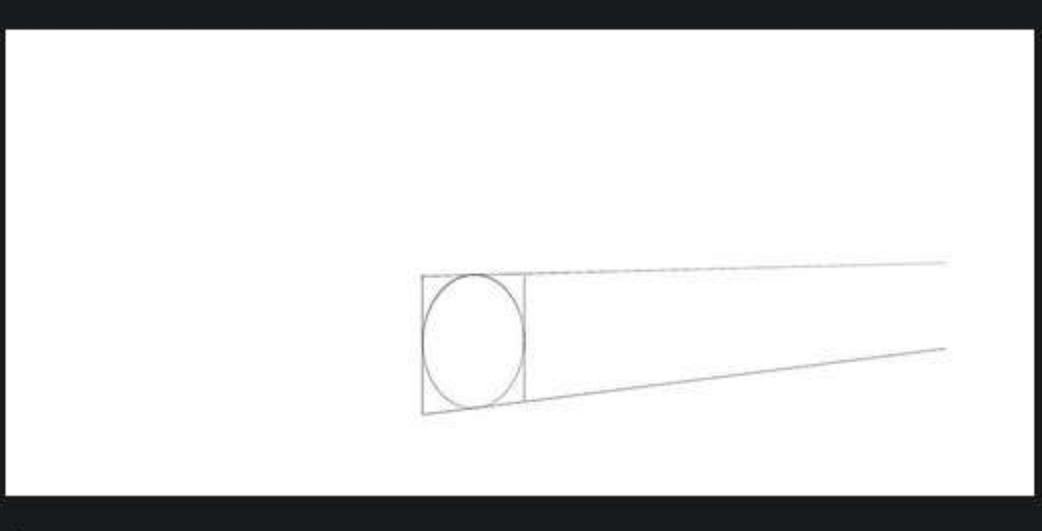
Step by step

Whenever dealing with cars, ALWAYS think in terms of wheels as measurement units. I mentioned this in the truck demo, but it's even more important here.

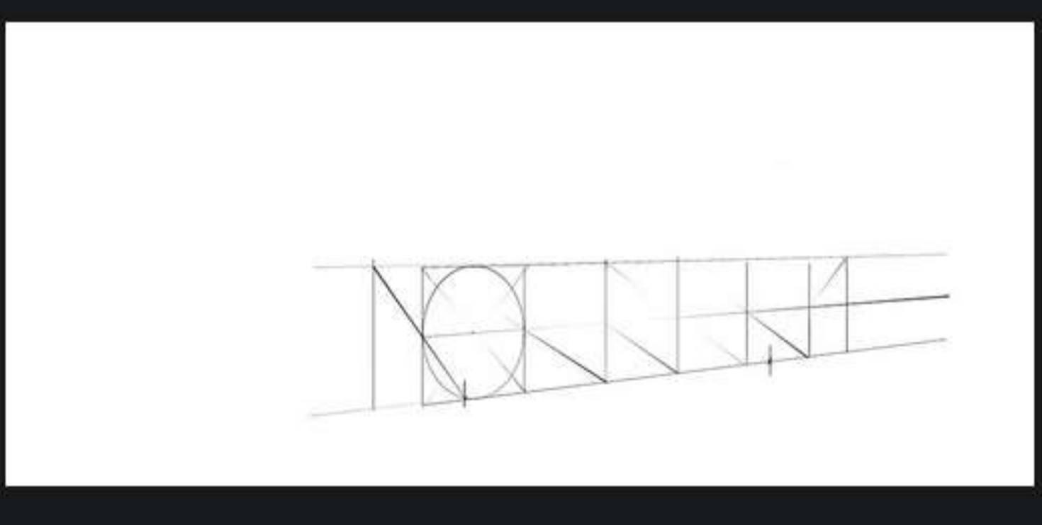
You'll notice that I've got a set of somewhat lighter wheels - six of them - running along the length of the car, not actually aligned to the car's actual wheels. Looking at the reference image, I noted that the car is roughly six wheels long and two wheels tall. I did extend my car a little further in each direction, largely to compensate for little discrepancies with this method of estimation.



In order to properly establish the proportions of my car, I want to use the perfect-circle approach. In order to do so, I define a vertical and two horizontal lines - the vertical to act as the bounds for the ellipse I'll be drawing, and the two horizontals to establish a vanishing point off in the distance, and define my perspective system.



Remember the criteria you're trying to hit. You want your ellipse to fit snugly between these three bounds. You also want the points of contact it has with the top and bottom lines to sit perfectly above/below each other. **Use an ellipse guide if you have one**. If you don't, accept that freehanding it won't be perfect, but it'll be good enough. Probably. Once you've got your ellipse down, close off the plane to establish what is now a square in 3D space.

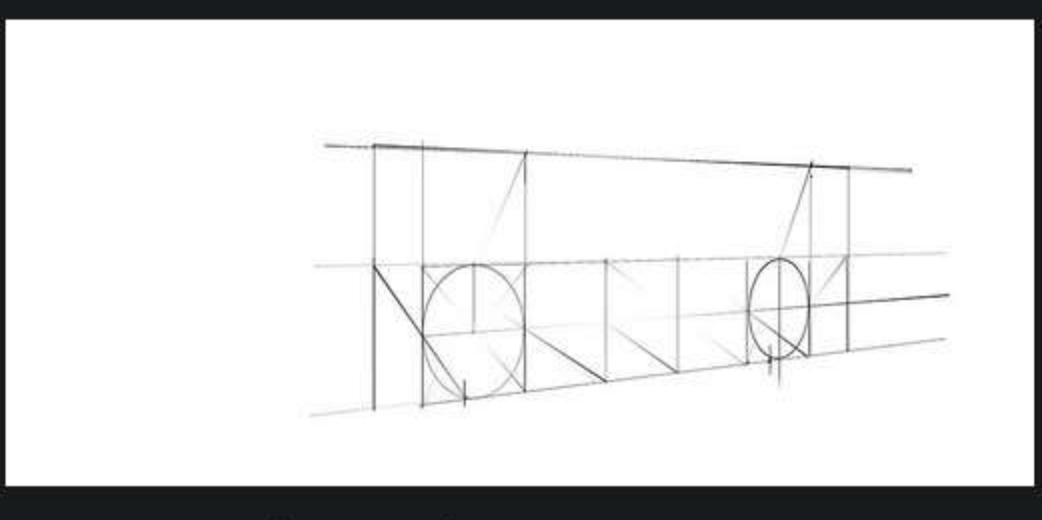


Okay, this image definitely looks confusing at first, because there's two things happening here. First, I took the measurement of that square in 3D space and carried it down four more times to establish five equal squares. Remember that the car is roughly 6 wheels long? Well, in observing my reference, I also noted that there are three wheel-lengths between the front and back wheels. This leaves roughly one wheel to be split up between the section in front of the front wheel, and behind the back wheel. To my eye, the front looks to be about 1/3 of a wheel, and the back appears to be 2/3. So what do we do with this information?

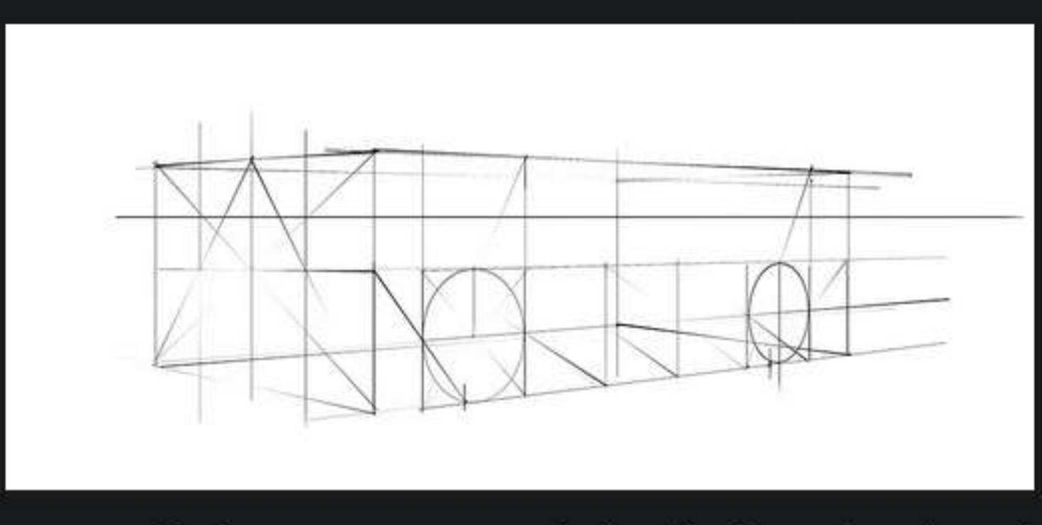
First, I don't want to clutter up my drawing by first measuring out six wheels, then placing the actual wheels in a way that doesn't actually align with any of the wheels I've put down in order to measure things out. So, I drew five wheel lengths, with the first and last ones actually corresponding with the car's actual wheels. All that's left is to tack on the front and back sections. But how?

That's where the additional marks come in - first I eyeballed a point that is about 1/3 of the way into the front wheel. Then I mirrored this measurement up and across the left side of that wheel's plane, giving me that same measurement directly to the left of the wheel. Did the same thing for the back - eyeballed a point 2/3 of the way into the back wheel, then reflected it towards the right.

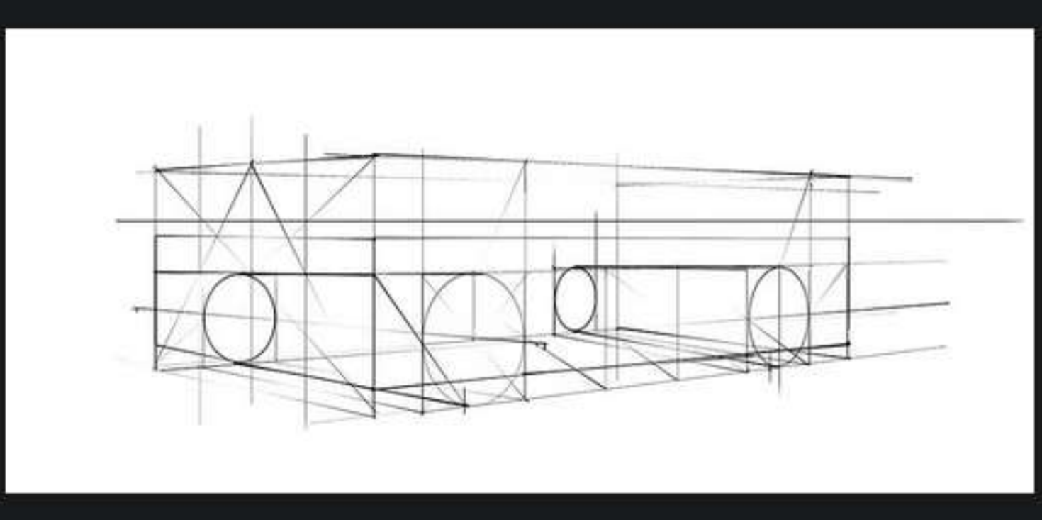
These transferring techniques are extremely useful when trying to figure out little finicky things like this, while maintaining a degree of accuracy.



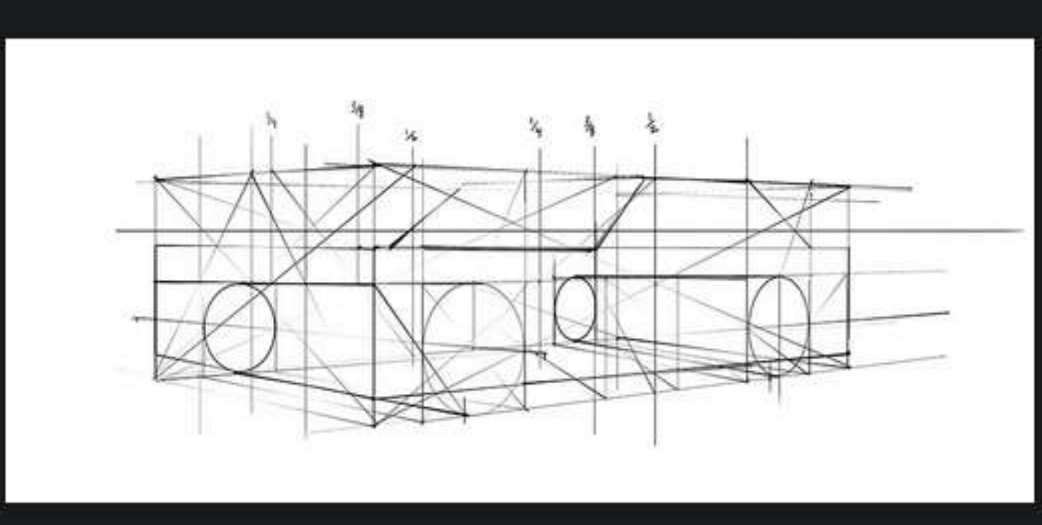
Now we're using the same technique to transfer the height of the wheel up. Since this drawing is in 2 point perspective, our verticals run straight up and down and do not converge towards a vanishing point. This means we could technically just take a measurement of the left-most wheel's left side and transfer it up, but I generally avoid that kind of approach wherever possible. It's just a lot better to get used to thinking about these techniques as tools at your disposal that can be used in any situation, and getting used to reaching for them rather than a measuring tool.



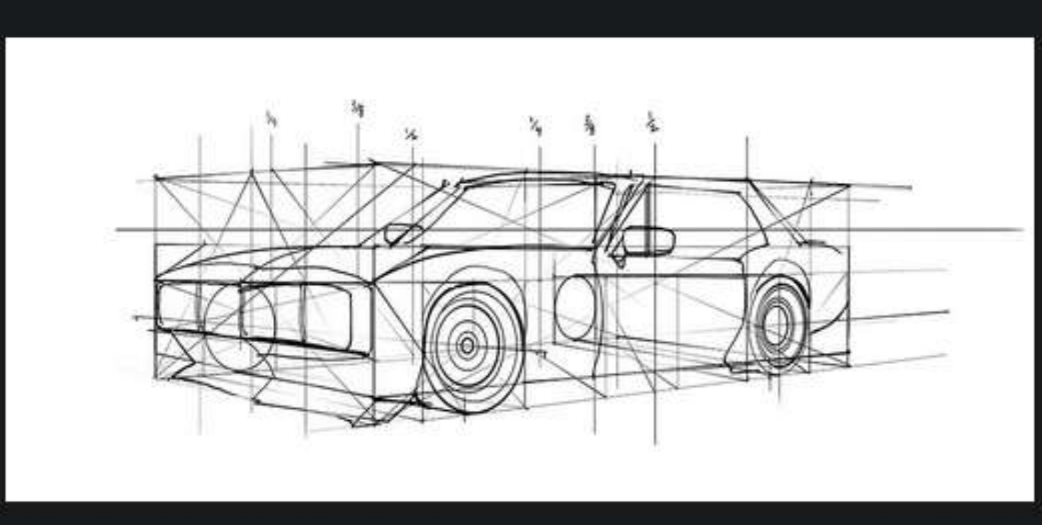
I will admit something - I skipped a pretty important part of all of this. I did a proportion study for the side of the car, but the front is also very important. Make sure you do proportion studies for every major side of the vehicles you attempt, as it will come in very handy. Since I have no proportional information to go off of, I've pretty much decided to wing it and extend the box out to a point that seems roughly correct to me.



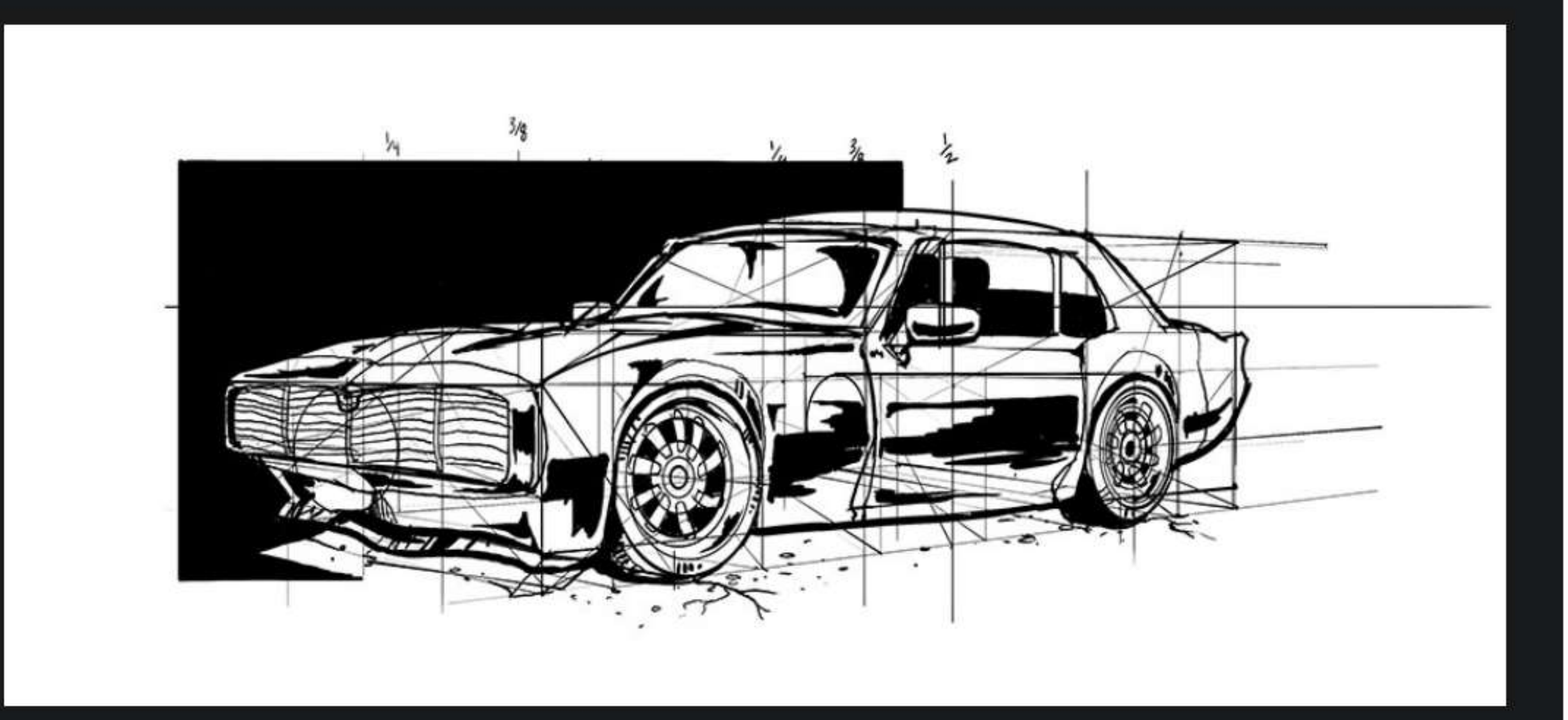
As I mentioned when dealing with the truck, you should whenever possible deal with wheels that share an axle as a single cylinder that stretches all the way across. This simplifies things and generally maintains cohesiveness between the two wheels.



Now that we have our box fleshed out, we can finally use all of our subdivisions to transfer the forms we identified during the proportion study and build them up by first stamping them onto the side plane of the box, and extruding them across. Notice that I'm not using any curves here - straight lines are in most situations going to maintain a sense of solidity that you want to hold onto as long as possible. Once you've got all of your forms fleshed out as solid blocks, then you can start smoothing them out. Don't do it any earlier than that.



If you think about it, all of the parts you need have already been drawn - all that's left is to refine your forms and add detail. With all of the subdivision, you can construct the remaining forms in a sort of connect-the-dots fashion, and then smooth over the resulting hard edges wherever necessary. That's the thing about construction - 99% of it is just preparation, but the last 1% of it is where the drawing suddenly jumps out at you and comes alive.



Not a whole lot to say - use whatever techniques, be it line weight, large filled areas of solid black, etc. to help organize your linework, reduce clutter and bring your object out of the mess.

<<< 1967 Shelby Mustang Demo

Informal Demos >>>

The recommendation below is an advertisement. Most of the links here are part of Amazon's affiliate program (unless otherwise stated), which helps support this website. It's also more than that - it's a hand-picked recommendation of something I've used myself. If you're interested, here is a full list.

The Art of Blizzard Entertainment

While I have a massive library of non-instructional art books I've collected over the years, there's only a handful that are actually important to me. This is one of them - so much so that I jammed my copy into my overstuffed backpack when flying back from my parents' house just so I could have it at my apartment. My back's been sore for a week.

The reason I hold this book in such high esteem is because of how it puts the relatively new field of game art into perspective, showing how concept art really just started off as crude sketches intended to communicate ideas to storytellers, designers and 3D modelers. How all of this focus on beautiful illustrations is really secondary to the core of a concept artist's job. A real eye-opener.

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Overview
- Prerequisites
- About your tools
- Introduction
- Repeating measurements in space
- Creating a square in perspective
- Orthographic plans
- Homework and exercises

Video Lectures
- Ellipses in planes
- Constructing to scale

Cab-Over Truck Demo
- Demo Video
- Reference
- Step by step

Coast Guard Boat Demo
- Demo Video
- Reference
- Step by step

1967 Shelby Mustang Demo
- Demo Video
- Reference
- Proportional Study
- Establishing our box
- Constructing our wheels
- The hard part

1967 Chevy Camaro Demo
- Demo Video
- Reference
- Step by step

Informal Demos
- Airplane construction

Lesson 7: Applying Construction to Vehicles

Informal Demos

LISTEN WITH DRAWABOX

Hate to read? No problem. **We can read the text to you.**

This feature is available **completely free**. While we will be keeping an eye on how feasible it is to eat the costs associated, we hope to keep it that way.

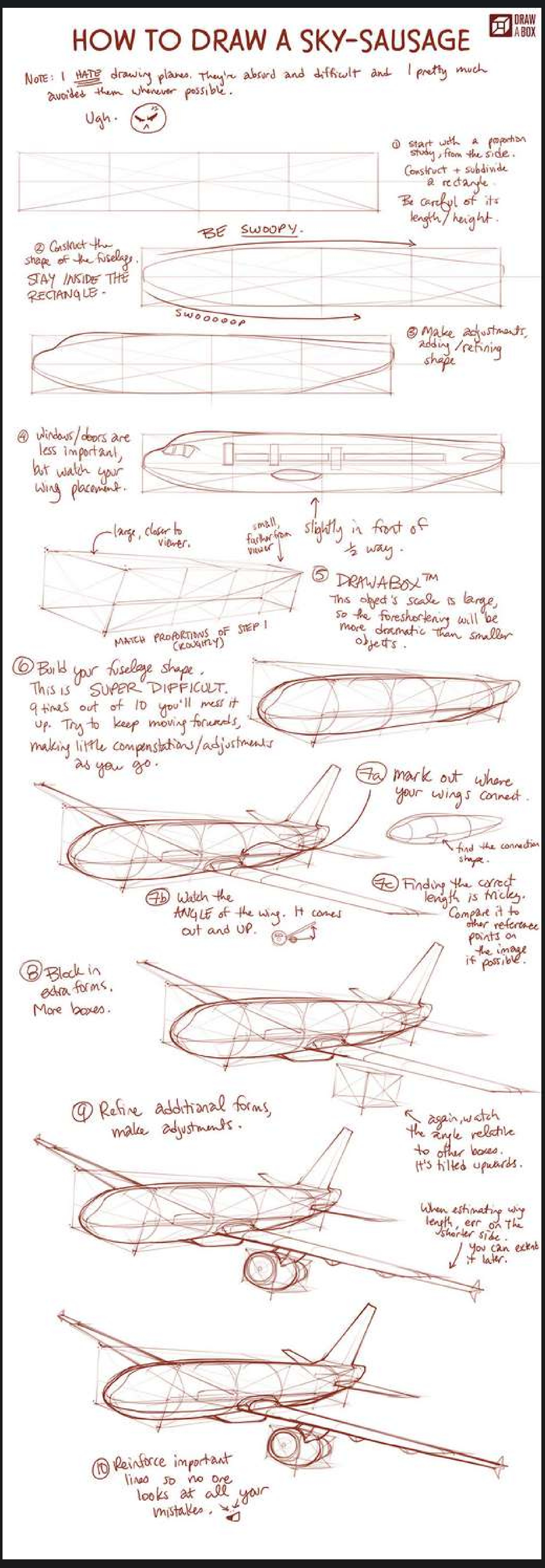
Just click "Listen with Drawabox"!

The demos here have been drawn in the course of a student's homework critique, but contain information that can be useful to all working through this material.

Airplane construction

Airplanes are definitely complex, similar in some ways to cars in that they focus on a series of curves running from front to back. Here's how I handle them.

Worth mentioning is how to draw out how far the wings should extend. Don't guess - instead, look at your reference image and try and find other features on the plane that align either horizontally or vertically with the wings.


HOW TO DRAW A SKY-SAUSAGE
DRAW A BOX
NOTE: I HATE drawing planes. They're absurd and difficult and I pretty much avoided them whenever possible.
Ugh.
① start with a proportion study, from the side. Construct + subdivide a rectangle. Be careful of its length/height.
BE SWOOPY.
② Construct the shape of the fuselage. STAY INSIDE THE RECTANGLE.
SWOOOOOOP
③ Make adjustments, adding/refining shape
④ windows/doors are less important, but watch your wing placement.
slightly in front of ½ way.
large, closer to viewer.
small, farther from viewer
MATCH PROPORTIONS OF STEP 1 (ROUGHLY)
⑤ DRAWABOX™ This object's scale is large, so the foreshortening will be more dramatic than smaller objects.
⑥ Build your fuselage shape. This is SUPER DIFFICULT. 9 times out of 10 you'll mess it up. Try to keep moving forwards, making little compensations/adjustments as you go.
7a mark out where your wings connect.
find the connection shape.
7b Watch the ANGLE of the wing. It comes out and UP.
7c Finding the correct length is tricky. Compare it to other reference points on the image if possible.
⑧ Block in extra forms. More boxes.
⑨ Refine additional forms, make adjustments.
again, watch the angle relative to other boxes. It's tilted upwards.
When estimating wing length, err on the shorter side. You can extend it later.
⑩ Reinforce important lines so no one looks at all your mistakes.

<<< 1967 Chevy Camaro Demo

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WHAT THE HELL AM I SUPPOSED TO DRAW?!

The Science of Deciding What You Should Draw

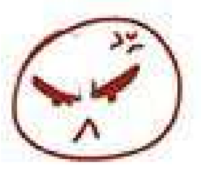
Right from when students hit the 50% rule early on in Lesson 0, they ask the same question - "What am I supposed to draw?"

It's not magic. We're made to think that when someone just whips off interesting things to draw, that they're gifted in a way that we are not. The problem isn't that we don't have ideas - it's that the ideas we have are so vague, they feel like nothing at all. In this course, we're going to look at how we can explore, pursue, and develop those fuzzy notions into something more concrete.

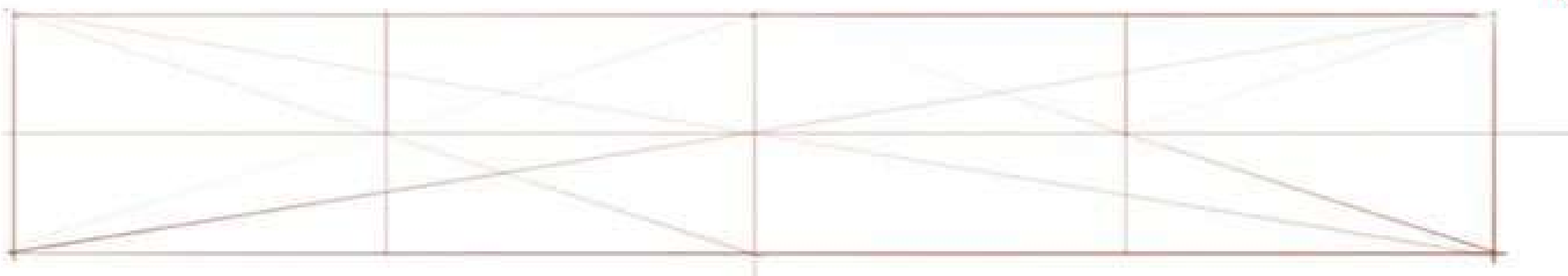
HOW TO DRAW A SKY-SAUSAGE

NOTE: I ~~HATE~~ drawing planes. They're absurd and difficult and I pretty much avoided them whenever possible.

Ugh.

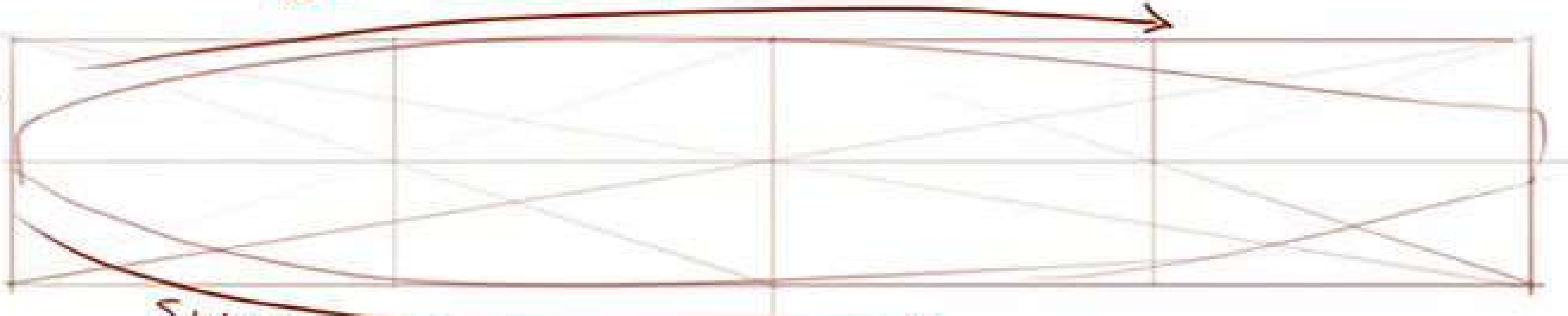


① start with a proportion study, from the side.
Construct + subdivide a rectangle.
Be careful of its length/height.



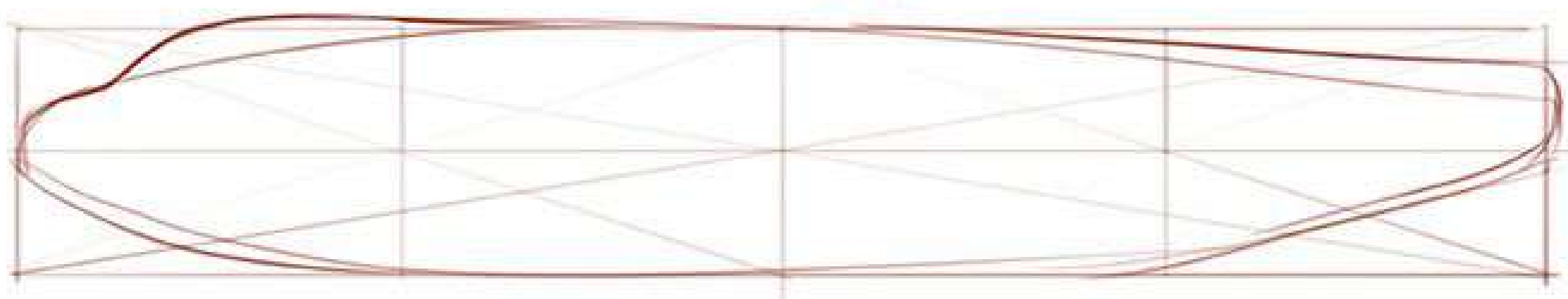
② Construct the shape of the fuselage.
STAY INSIDE THE RECTANGLE.

BE SWOOPY.

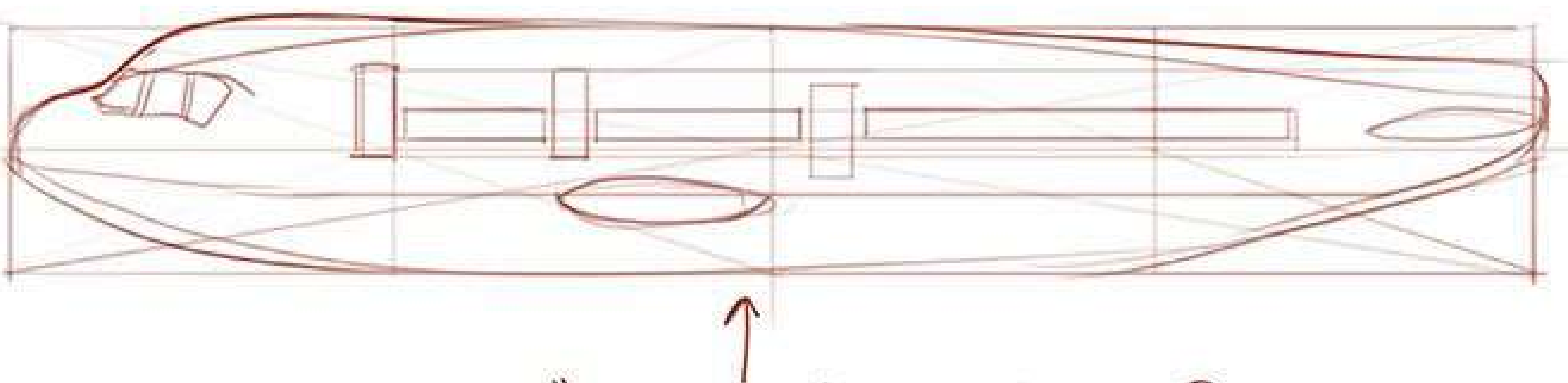


SWOOOOOP

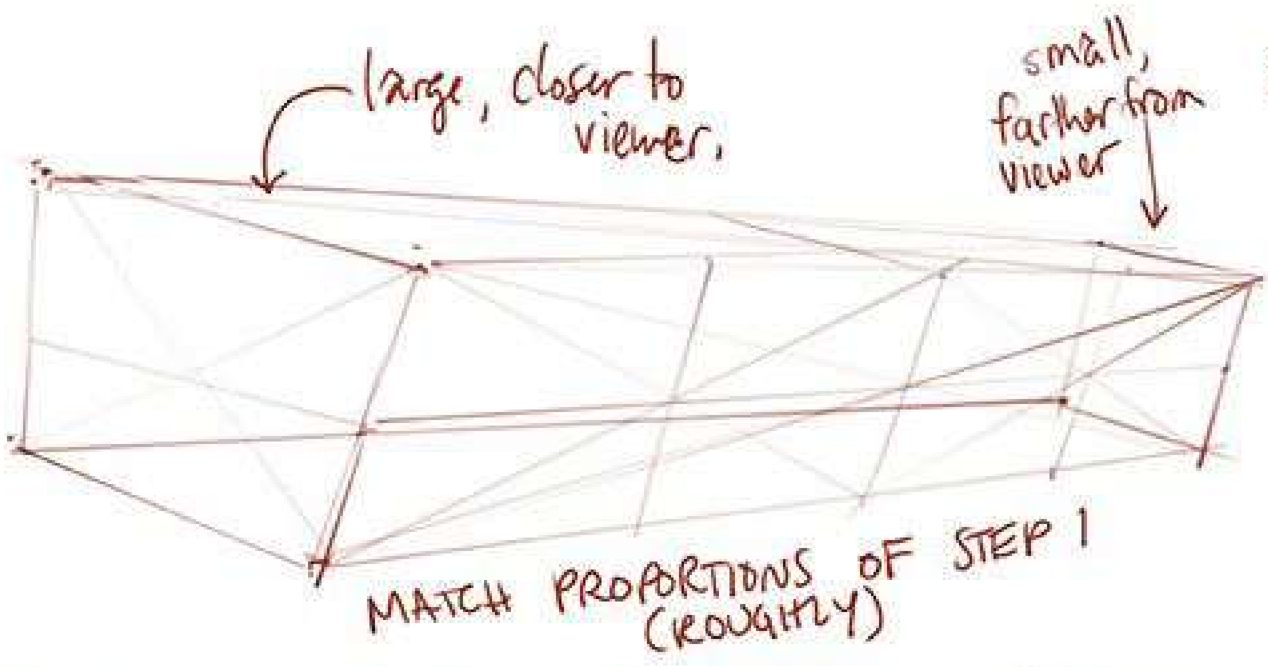
③ Make adjustments, adding/refining shape



④ Windows/doors are less important, but watch your wing placement.



slightly in front of ½ way.



large, closer to viewer.

small, farther from viewer

MATCH PROPORTIONS OF STEP 1 (ROUGHLY)

⑤ DRAWABOX™
This object's scale is large, so the foreshortening will be more dramatic than smaller objects.

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This is SUPER DIFFICULT.
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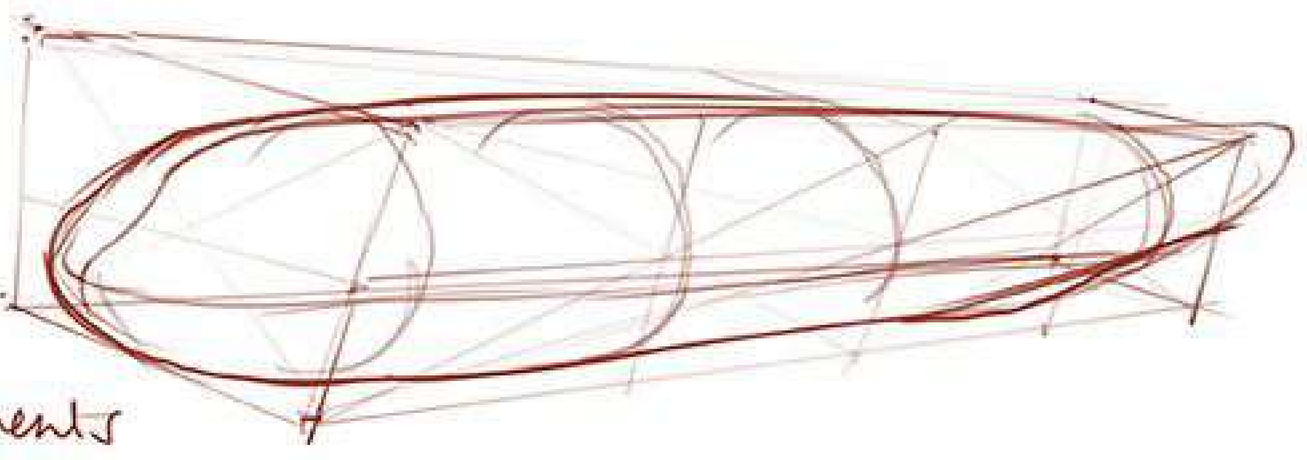

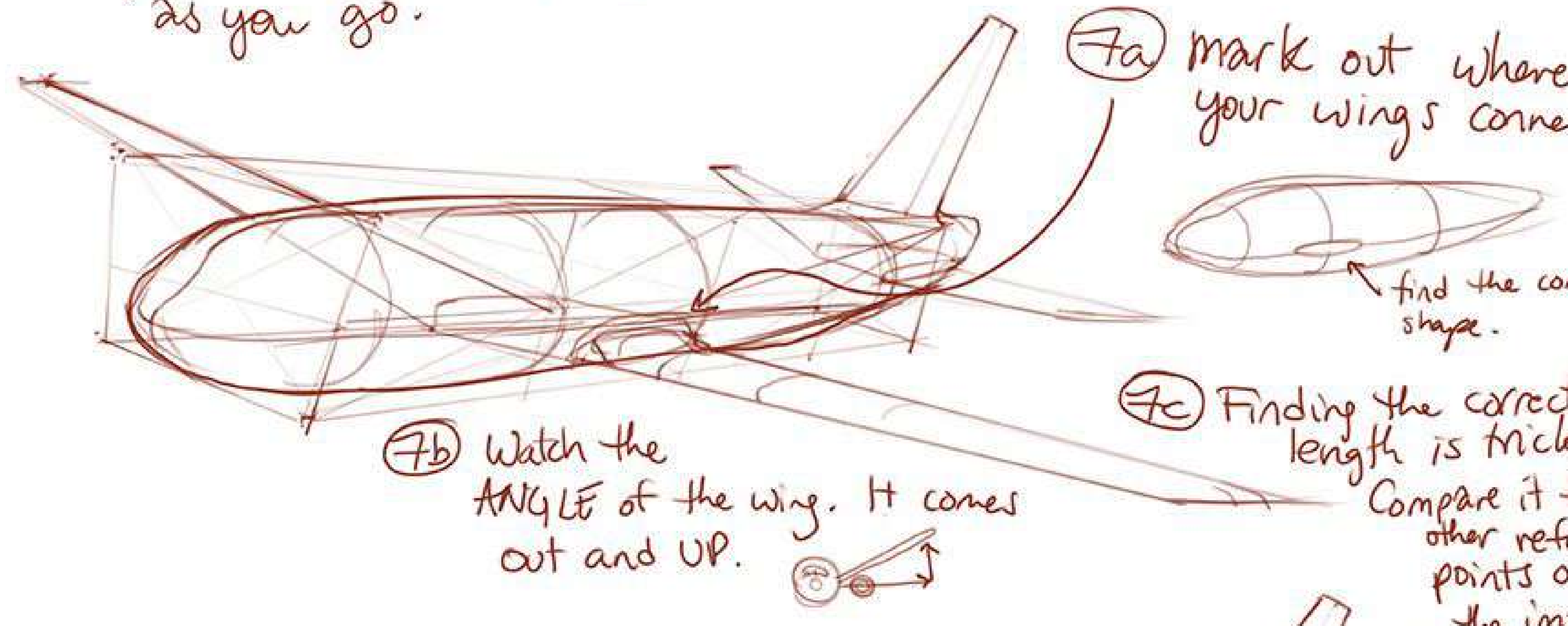

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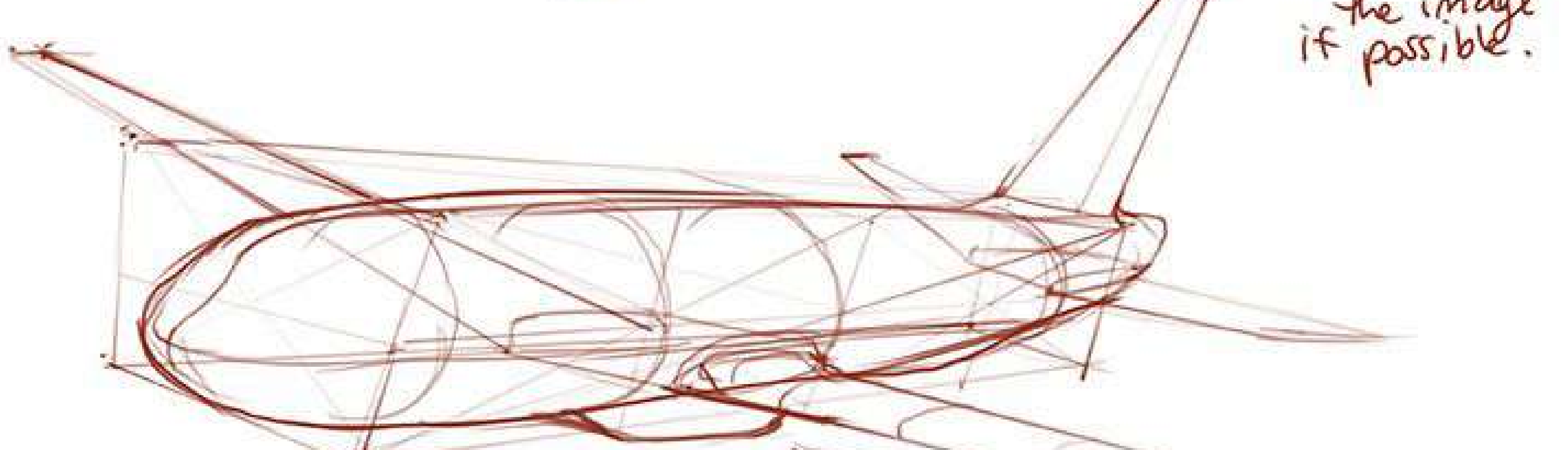

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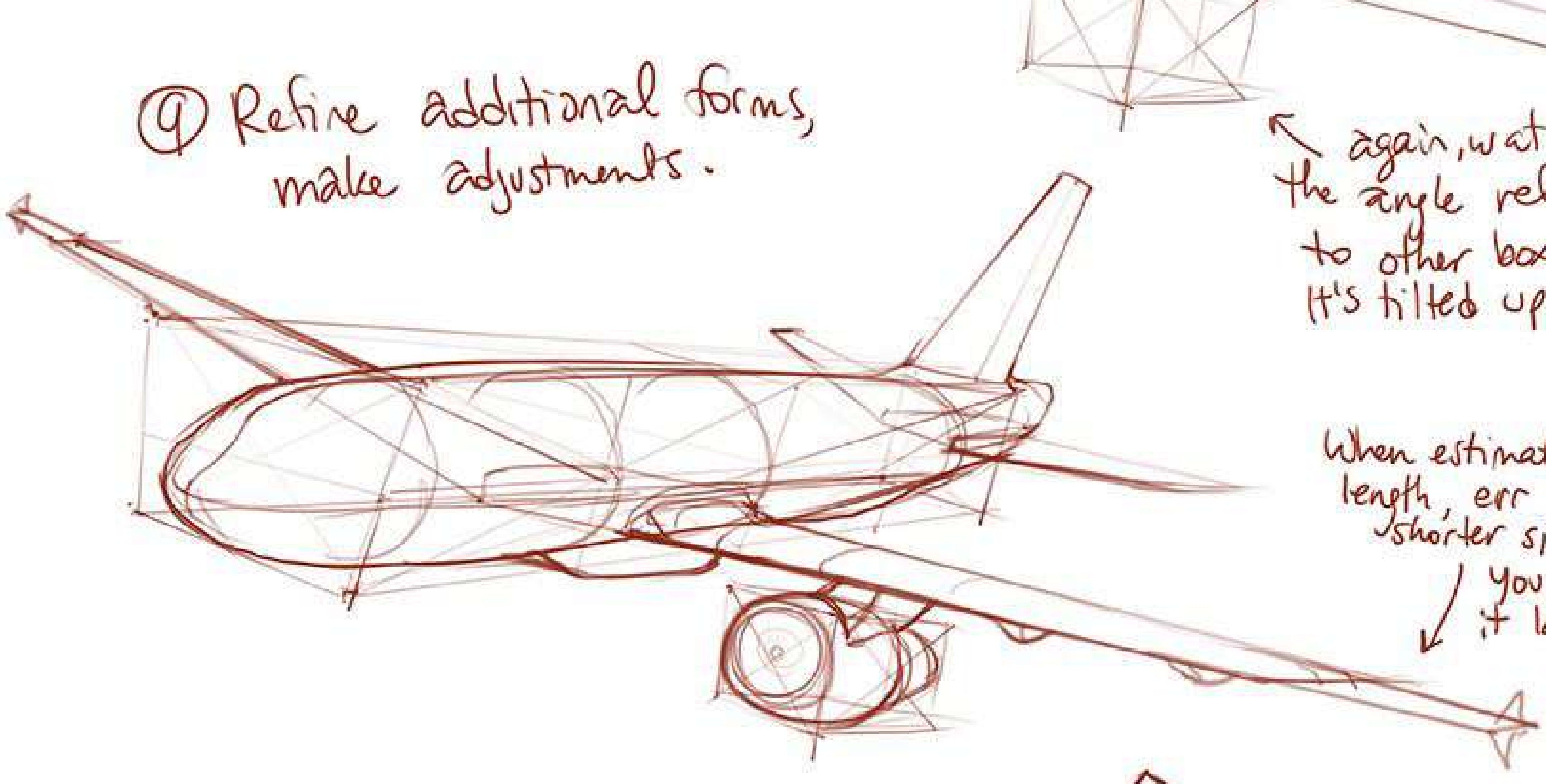

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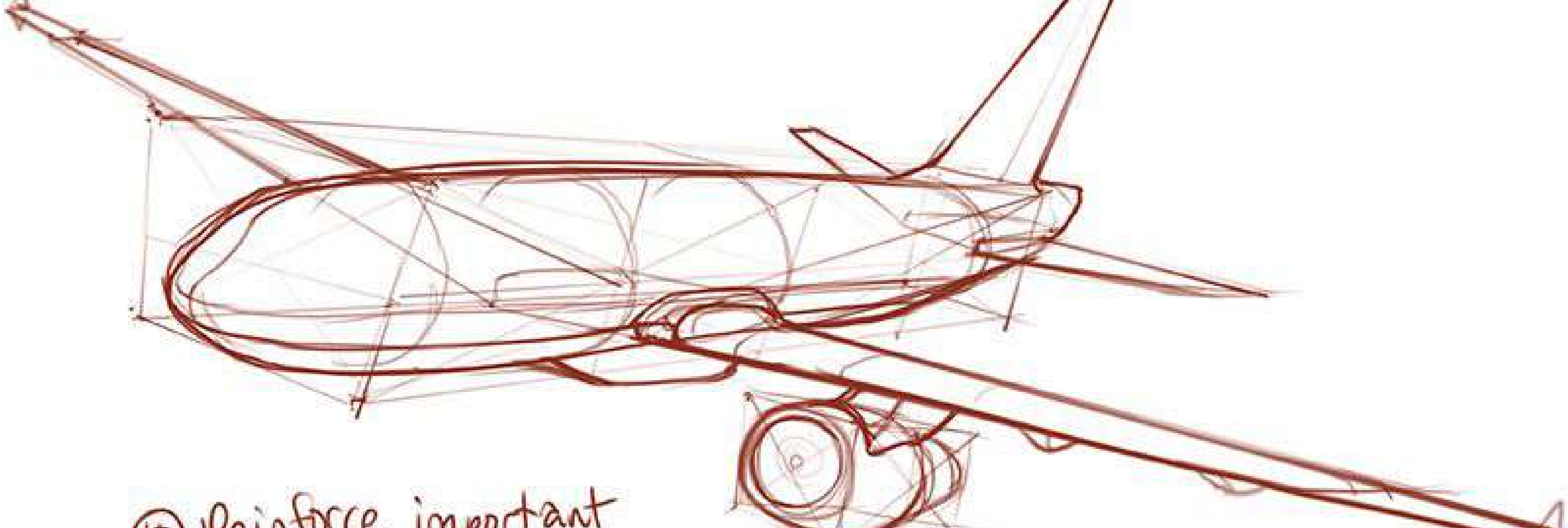

⑩ Reinforce important lines so no one looks at all your mistakes.